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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

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EDITORIAL NOTES.

Duty's Response.

"I AM proud to be able to show to the world that my peoples "oversea are determined, as the people of the United King-"dom, to prosecute a just cause to a successful end." These words appear in the message that His Majesty the King has sent to the Governments and peoples of his self-governing Dominions. Just as the King is proud of his peoples oversea, so are all connected with the British gas industry proud of the part that it has taken, and is taking, in the prosecution of that just cause to a successful conclusion. Immediately upon the declaration of war, there was a spontaneous movement in the industry, which showed how high in all ranks flowed the tide of patriotism and loyalty. There was no hesitation as to what was the right thing to do. The call to the colours was responded to with alacrity everywhere. To-day it would be a rare thing to find a gas-works or the establishment of a gas plant or gas appliance manufacturer that has not representatives at the war, or preparing to go, or in some other way serving the country. From the larger works the number of men who have responded to the voice of duty is measured by hundreds, from others by tens, and from the small ones by less. Were we able to ascertain the aggregate number, there is confidence in saying that it would be found that the gas industry's reservists, territorials, naval men, and volunteers, would alone make up an army of which the industry would be intensely proud; and these men are drawn from all ranks of the employees—from the muscular stoker and brawny main layer to the members of the fittings departments.

The gas-worker makes a splendid soldier or naval man—and more so now than ever. In our gas-works of recent years, there has been a veering round (in some cases more than in others) to the conditions that existed before joint-stock enterprise came and made a deep cleavage in the relations between masters and men. Under the more modern conditions, these relations have been in various ways largely restored. With this restoration, discipline, self-respect, and social promotion have been silently winning way, and coincidently the greater recognition on the part of the workers that there are honourable obligations on their part to perform, and interests to serve and defend. There is the stamp of the altered conditions on the men; and to-day were there to arise the need in any tussle where strength, loyalty, and discipline were requisite, we could wish for nothing better than a following of British gas-workers. In mentioning the workers, we must not forget those other workers who constitute the staffs of gas and manufacturers' works. They, too, have made a considerable contribution to the numbers of those who have already answered the appeal for support for the country's honour and good name. The gas industry is proud of its soldiers and its sailors; it is proud, too, of those who, being left behind through no fault of their own, are not in these times tethered by strict rules, but have pledged themselves to do their parts to make good the blanks in their ranks, and to carry on the public service while friends and mates are away doing the more serious work to which King and country have called them.

It is all good. There was other spontaneity at the beginning of the war. Anyone witnessing from the outside what we have witnessed from the inside might have been excused for thinking that the gas industry had a cast set of rules to be observed by gas directors and committeemen on the outbreak of hostilities involving several nations. There was not only spontaneity, but there was unanimity. It was remarkable evidence of a oneness of spirit among administrators and officials that, within a few days of the outbreak of the war, came to us from all quarters of the British Isles. Everywhere those in authority in the industry gave the best encouragement to a good response to the call for men for the front, or else to defend the country from the plots of the enemy within or the invasion of the enemy from without; everywhere, and without delay, administrators of gas-works and principals of firms made lighter the compliance with orders to reservists and territorials and the voluntary response to the call for more men by promises to supplement military or naval pay by the amount required to make up ordinary wages, or by half pay or other scheme, so that wives, children, aged parents, or other dependants should not suffer while they are away, and to welcome the men back again in due season to the places which their fellow workers are keeping "warm" for them during their absence. The martial spirit, and the desire to serve in one way or another, have taken good hold of the country. It would have been a very good thing had the movement been seen earlier. There has been a rude awakening; but Great Britain never yet confessed to a lack of resource and courage. There are large numbers of men in the employ of gas undertakings who either on account of age or some other reason cannot join the colours. The gas industry is one of those services that cannot afford, in the public interests and safety, to be deprived of all its skilled men. Several tens of thousands have been left at home; and, in many gas-works, those in authority are rightly of opinion that a man who knows how to shoot in such times as these may prove useful to his country, and add to its strength, without going abroad. Rifle ranges for shooting practice have therefore in some cases been provided; and, in certain gas-works of which we have heard, the men are drilled by military instructors specially appointed for the purpose. The pressing need of the country has also urged some gas administrators to issue announcements that single men fit for military service who do not volunteer are liable to be called upon to relinquish their employment in favour of ex-service men and men too old for service. The places of some of those who are able but unwilling to serve may be required when men who have served their country return, and are again in search of employment at home. The men who have bravely fought for the country, and have borne dangers, toil, and hardships day and night, must later on be looked after first, while those who have preferred the comfort of a normal and routine existence during the war, and yet are single, physically fit, and of right age for service, must receive secondary consideration in the distribution of appointments and work.

Still another way in which the gas industry has done, and is continuing to do, a large and good part is by contributing to the provision of funds for the relief of sufferers from the war. Not all industries have made, or will make, the provision for dependants that the gas industry has made. The wan face of privation has already been seen in a number of districts, and relief is already being made. What is seen now is only the beginning of a far more serious state of things. But here, again (though the gas industry is doing its part nobly and well among its own people), gas directors, gas committees, manufacturers, officers, and men have also had large-hearted thought for those who are less fortunately circumstanced. The Prince of Wales's Fund has found generous contributors in the industry. We do not boast of this; but there is pride in the fact that the industry is substantially interested in the fund. The question of illegality of contribution was raised, but it had brief existence. This is the time when above all others we are able to realize in fullness that we are responsible units of a nation, and as such have a duty to perform. Illegality? Pshaw! Duty first. And gas companies, gas committees, and the industries from which gas undertakings draw their supplies of plant and goods have contributed from their funds in amounts of magnificent order. The subscriptions of individuals in the gas industry is an unknown quantity, but the total must be great. The rank-and-file of the workers of the industry, too, are doing in many towns their part by weekly contributions based on pence per pound of wage; while in some cases the workmen co-partners are making special contributions from their bonuses to one or other relief funds. Information as

to what the Gas Light and Coke Company's men are doing appears in our "War Notes" to-day.

This is all excellent. The gas industry in its work is so greatly in touch with the masses of the people, that its administrators, officers, and men can perhaps realize more than many others who are less in contact with the life of the people what the present and anticipated distress and suffering all mean. The industry and its men have indeed shown not only a great patriotic spirit, but a very human side. May this always remain in evidence! To-day, however, our thoughts are especially with those brave fellows who are at the front, and those who will soon be leaving our shores, and who in times of peace are workers in the industry. Our good wishes are with them. For the men of our industry, as well as for their comrades, our prayer will be for continued success to their arms, and for a safe return to home, friends, and work. The day of their victorious return will be a day of great rejoicing.

Home Productions.

DURING the discussion that has been proceeding in the Daily Press on the subject of taking advantage of the present opportunity of seeing how far in manufacture and commerce we can be independent of Germany and Austria, and help, to our advantage, other countries to be also independent of them, it has been obvious that we have still in our midst a good many Little Englanders. "It cannot be done. Ger-" many is already there. It has the factories, plant, men, " distributing agencies, and the business connections; and " the present is only a temporary interruption." Those are the sort of views one sees in some places; but, fortunately, the holders of them are in a minority. If the whole country looked at the position in that light, then would be continued the old insidious creeping of Germany into our trading and commerce in lines with which this country ought to be quite capable of dealing, and the extraordinary golden harvest of Germany, through agencies, German capital, and disguised "British" firms, would yearly grow. What Germany and Austria have industrially done, England can do, providing the raw materials are as available in, or to, this country. Germany has only built up its present industrial position, and trading beyond its own frontiers, gradually and methodically; and these are the courses that must be taken by this country. It is impossible to produce in a day an industrial and commercial revolution such as is contemplated; but it is possible to accomplish great things by systematic progress, perseverance, and united resolution. In the "united resolution," buyers must have a large part. If there is an enlarged demand for British-made goods, the home manufacturers will do their utmost to supply it. There is, however, quite naturally a little fear on their part. Their trust in the British buyer has been so undermined by experience that they naturally wonder whether they may construe the present antagonistic feeling towards German goods as something permanent or only transient, and whether, when peace is restored, there will be a vigorous support of British productions or a gradual back-sliding.

Take, for example, some lighting requisites. There has been among the gas managers of this country a very large patronage of German productions solely on account of cost, with a blind-eye to weight of metal, finish, and performance. Cost is important. But why should a good many things cost less that come from Germany than their like from our own factories—given equality in the availability of material? There is no reason at all. Labour may be cheaper; but transit is a set-off. Quantity may be a factor; quantity must be worked for in this country. Intrinsic value should also count. There is not a single thing in connection with lighting that need come to this country from Germany or Austria, unless it be heat-resisting glassware; and there we have to confess the highest merit does not rest with this country. But it is not all glassware that is exposed to exceedingly high temperatures. The beautiful prismatic glassware of a well-known company is entirely produced in this country. The fact of the matter is we have been docile and receptive in this regard, and have found the enlargement of the borders of our patronage an easy way of avoiding the trouble of producing new things in this country. Germany has not overlooked the disposition. But necessity is teaching us our own capacity; and the immediate effect (as one gentleman connected with the lighting trade puts it) will be to prove that many things and parts previously made in Germany can be manufactured quite readily in this country. If they can be manufactured in war time, why not in times of peace? If they are being manufactured now, why should not the means of production be gradually increased till the whole demand of the country, and perhaps of some other countries, is satisfied. There is the question of mantles. We hear that some firms in this country are pursuing tactics (through circulars) that buyers consider are but the preludes to much higher prices; and there is also talk of a mantle famine. With the stocks that are in existence in, and the resources of, this country, propriety is a long way off sanctioning as legitimate the use of the word "famine." One of the well-known manufacturing firms in this country, writing in our "Correspondence" columns to-day, say: "It is difficult to " see how there can be a famine in mantles before long." Further, if the members of certain associations before whom the famine bogey has been dangled "will only apply to the " *bonâ fide* British manufacturers, they will find no difficulty " in getting all the mantles they require." Even mantle rings are being made in a London suburb within a mile of our correspondents' factory.

We do not believe in much of the Daily Press inflated talk about the United Kingdom pocketing all Germany's outside trade; but we have firm confidence in the United Kingdom being resourceful enough to profit largely from the present incarceration of Germany's manufactures owing to those in high places having had a misplaced belief in the omnipotence of the national military system and of its mobility, which were in days (there was no thought of weeks or months) to give, by subjugating other nations, Germany and her industries a "larger place in the sun" than she had ever previously occupied. The best-laid schemes sometimes miscarry. It has been so in this case; and the British Isles have good hopes of profiting by it. At any rate, three good intentions have been formed; and they are to make this country as self-contained as possible in meeting its own requirements, to obtain and to enjoy a larger part of the overseas trade, and to treat as they deserve to be treated firms operating under an appellative disguise. There is no objection to firms who settle, and carry on their manufacturing operations here, and prosecute an above-board business. But Britishers do not like a thing which has about it a wrapping of deceit, more particularly those who find they have been among the duped.

But even German concerns who carry on manufacturing operations here, and pay more in wages and for British material than they send out of the country in dividends, and against whom there can be little or no objection, are in a position altogether different from gas undertakings on the Continent that are largely British capitalized—for example, the Imperial Continental Gas Association, the Berlin works of which appear to have been taken under State control presumably during the course of the war. Enterprises of the kind are worked under concessions, which carry heavy *quid pro quo* financial obligations. For instance, when, a few years ago, the Imperial Continental Gas Association effected an extension of their Hanover contract to 1950, they paid in solid cash £500,000 in three annual instalments, and made other contractual conditions of much benefit to the city. The salaries, wages, rates and taxes, and other money expended by the Association in Germany amount to such considerable sums that the dividends on the immense capital sunk in the country look insignificant alongside, and the dividends are indeed well earned. This is a class of investment of capital which has no parallel in the investments of private firms established without even "by your leave," and with no contractual responsibilities, obligations, payments, or other conditions for the privilege of prosecuting business.

The Continuous-Intermittent Vertical System.

TO-DAY the account of the proceedings at the North British Association meeting is concluded by the publication of the paper read by Mr. James Dickson, of Johnstone, together with a report of the discussion. The subject is the installation, at the works that the author has charge of, of eighteen retorts, each of a daily carbonizing capacity of 3 tons, on the Wilson-Glasgow continuous-intermittent system. But Mr. Dickson, in his desire to tell the whole tale of his experiences with the new plant, occupies the greater part of the contribution with information as to trials and difficulties (some of quite local origin), and first results, before he relates what is now being done by the installation assisting in works' economy and efficiency. The treatment obscures the real and main interest. When a man gets per ton of

coal carbonized 10,808 cubic feet of gas of 17-candle power, and of a calorific value of 647 B.Th.U. gross (with, as we understand, a somewhat cheaper class of coal than he was using when only obtaining 9820 cubic feet of gas), then he is not doing at all badly. When, too, the tar yield is found to be 15 69 gallons, and the liquor yield to be equivalent to 29·48 lbs. of sulphate of ammonia, the position in favour of the new installation is still stronger. The labour costs, too, have decreased by 1·94d. per 1000 cubic feet of gas made—despite the early troubles. There are in the Johnstone working experience less favourable points, and to these we will refer presently. But the system must not be judged on the first part of the paper, because, if this were done, there would be a miscarriage of justice. Before passing on, it may be remarked that there is gratification in observing that the price of gas at Johnstone—1s. 10d. per 1000 cubic feet—is, considering the quality that is supplied to the consumers, a low one; but it is a question for Mr. Dickson to consider whether it would not be an advantage to stretch the gas, obtain a greater yield, and give the consumers gas of lower calorific value than is now supplied, and at a still cheaper rate. If one looks at the two tables showing the composition of the gas derived from partial charging every 4 hours 48 min., and of that realized from partial charging every 4 hours, the reason for the suggestion will be at once apparent. If it is not, then the article by Mr. Fairweather in last week's issue will throw some light upon the matter—see pp. 557, 562.

The distinctive feature of Mr. Alexander Wilson's vertical retort practice is that of the old Settle-Padfield plan; and it is owing to this that, in the absence of a better term, the system is described as a continuous-intermittent one. It is not a continuous system in the ordinary acceptation of the term; and its intermittency is measured by four hours' partial discharging and charging. The primary object (apart from structural simplicity) that Mr. Wilson had in designing and perfecting this form of vertical retorts was to deal with the secondary coking coals of Scotland, while not having to forfeit the whole of the advantages of continuous operation in the matter of uniform constitution of the gas. The four-hour partial discharging and charging interval gives, on the one hand, the density and compactness to the charge which is necessary with second-rate coking coals if a good class coke is to be obtained; and, on the other hand, the temperature of the retort being a descending one from the top to the bottom, the principal part of the gases is driven off promptly with every fresh four-hour top charge, and are not subjected to the destructive action produced by long travel through, and in contact with, a great bulk of incandescent material. The quantity and quality of the gas that Mr. Dickson shows is now obtained under his conditions are proof of the success of the system, which, if useful for Scottish coals, must assuredly be equally useful for many English coals.

It cannot be attributed to the continuous-intermittent vertical installation that it was in any way responsible for the chimney draught troubles which were experienced at the advent of the working at Johnstone. The chimney was not designed for the vertical retort bench, but for the old horizontal settings; and it is 25 feet away from the end of the vertical bench, and is connected thereto by an underground flue. How Mr. Dickson temporarily overcame the trouble of an insufficient vacuum makes very interesting reading, although the expedient of applying a fan is one which can only be looked upon as temporary, and will be supplanted in due season. Yet another trouble is the accumulation of pitch in the hydraulic main, which has to be removed once in ten days during the summer, and once a week during the winter. The greater part of this trouble appears to be caused by some of the coal dust getting over into the main during charging. When a matter of 10 cwt. of coal is dumped into a vacant space 7 feet deep, flying dust cannot be avoided; but perhaps some modification in construction would help to lessen this disadvantage. The scurfing of the retorts is another considerable task at Johnstone; and we can hardly reconcile the condition described with the excellent quality of gas and the high production of tar from the secondary class of Scotch coals. From beginning to end, Mr. Dickson says that some 54 to 56 hours are expended at each scurfing, and that the retorts then run for six to seven weeks. This is a short interval; and it means that in scurfing alone, without anything else, each continuously used retort requires about sixteen days a year for this operation; and, if the whole plant were kept continuously running, the scurfing of the eighteen retorts would represent a total of 288 retort-days out of action, which, in turn, would mean a considerable tax on the carbonizing capacity. Another point is the low make of coke, and the high fuel account. Mr. Dickson says that the coke yield has fallen from 9·90 to 8·78 cwt., and that, when high makes were being obtained, he found the fuel account was as high as 16·42 lbs. per 100 lbs. of coal carbonized. The high fuel account may be partly accounted for by the trouble with the chimney draught; and the lower yield is partly attributable to the drier coke realized than from the horizontal working. But too much need not be made of this point, in view of all of *per contra* order—higher gas make, good illuminating and calorific values, and high tar and ammonia yields. The point as to the retorts being made of reduced capacity—say, halved—for small works is also raised by Mr. Dickson. This is worth consideration. But the reduction of the daily capacity to 30 cwt. would deprive the charges in the retorts of some of the weight which is found to be useful in realizing a coke of respectable physical characteristics from the secondary coals with which the retorts were originally designed to deal.

Hygienic and Silent Gas-Fires.

THERE is no question that the "Lancet," through its new hygienic efficiency test for gas-fires, which had birth subsequent to the "Shadowgraph" test, has rendered excellent service in helping the wave of popularity of the gaseous method of heating to gather further strength. There is no body of influential men whose good opinion regarding the hygienic efficiency of gas-fires the gas industry desires to possess and to maintain more than the medical profession. The gas industry has long since done a large amount of practical work among members of the profession, and has widely proved its case to complete satisfaction; but the independent tests of the "Lancet," showing a clean certificate of hygienic character for several makes of gas-fires, will assist in softening the indurated traditional misconception still found among a few medical men who are sadly lagging behind the times in this matter. We freely admit the great benefit of the work done, and done generously, by our contemporary, as well as the value of the new test that has been given by it to the gas industry. So far the "Lancet" staff have "initiated an important movement." But there is one sentence in an article in the current issue of our contemporary which appears to take credit for the whole initiation of this movement for the suppression of gas-fires that do not comply with a standard which ensures the escape through the proper channels of the whole of the products of combustion. The "Lancet" says: "It is gratifying to find "that we have initiated an important movement in regard "to rendering this method of domestic heating acceptable "from the hygienic point of view." It is only right to give credit where it is due; and the credit for the revival of this hygienic question, and the establishing of the new standard, should most certainly be given to the Davis Gas-Stove Company, whose idea was first promulgated in, and supported by, the "JOURNAL."

From the further article in our contemporary (which is reproduced in this issue), it is seen that half-a-dozen fires of the Richmond Gas Stove and Meter Company's make have been submitted to the carbon tetrachloride test; and in regard to all of them negative results are shown in respect of the escape of products of combustion under the canopy—the fires being tested both without elbow in the open room, and with 2 feet of flue-pipe attached. There are indications in the article that the "Lancet" laboratory staff are of opinion that the standard which exacts in the open room a negative result from a gas-fire unaided by 2 feet of flue-pipe is rather too stringent; and that when a gas-fire shows no leakages, tested in the open room, with 2 feet of flue-pipe attached, then all that is required by hygienic considerations has been done. We agree, if the 2 feet of flue-pipe is always fitted; but the experience is that, while the manufacturer proposes, the gas-fitter disposes. If the fitter (unless a very rigorous supervision is kept over him) finds, owing to the construction of the fire-place, the fitting of a short length of flue-pipe is at all an irksome job, he follows the simple labour-saving plan of omitting it altogether. Therefore, we prefer, for absolute safety, the gas-fire that complies to the full with the new standard. The fact that makers of gas-fires can, as the chemical test proves, construct fires that in every particular accord with the standard, without

affecting radiant efficiency, shows that there is no necessity for withdrawing any one of its stipulations. It is just as easy to construct fires that will answer to the standard as to construct them defectively so that they fall far short of it. We do not look upon the doing of a thing properly as being a "refinement;" and when gas-fires are properly constructed, we attain to the position so well expressed in the following sentence from our contemporary's article: "One thing is "perfectly clear, that a fire passing this test will, from the "hygienic point of view, be free from reproach under practi- "cal working conditions."

The proof is clear as to the presence on the market now of gas-fires of high radiant efficiency and irreproachable hygienic character. All that is at present wanted to round off merit is that the irritating noise of all fires should be suppressed. This is a matter to which the "Lancet" calls attention, and not without reason. As it points out, gas-fires are of the greatest convenience and service in sick rooms; but it is very desirable that their excellencies should not in such rooms be discounted by noise disagreeable to the patients. Some of the makers have been working at this problem, which has presented difficulties owing to radiant efficiency depending largely upon the temperature of the flames, and the temperature of the flames upon the degree of aëration of the gas that can be effected. But there has been success in surmounting the troubles encountered in reconciling what appeared to be opposing forces and conditions. In an article in other columns, it will be seen that Messrs. Wilsons and Mathiesons have had a patient investigation rewarded by the production of an effective silencer; and the "Lancet" article refers approvingly to the one that the Richmond Company produced last gas-fire season. This is a matter which some of the other stove makers should take in hand as early as possible, as the triple alliance—hygienic efficiency, radiant efficiency, and noiselessness—is to be a feature of next heating season's campaign. This triple alliance is not likely to fall to pieces in the manner of which there has been remarkable illustration on the Continent.

Pioneer Derby.

In a preceding article, comment is made upon experiences with the Wilson-Glasgow vertical retort system at Johnstone, which experiences cannot be admitted to be in any way conclusive. Upon Mr. Dickson's paper, comes the news that the system is about to be installed, on a fairly considerable scale, at the Derby Gas Company's works—the Directors having adopted the recommendation of their Engineer (Mr. J. Ferguson Bell) to erect a plant of a productive capacity of 1¼ million cubic feet a day. Great interest will attach to this installation, as it will mark the advent of the system into work under English conditions, and more especially as the carbonizing results at Derby, with filled horizontal retorts, are of excellent character. This fact alone indicates that Mr. Bell must have found something very persuasive about the system to lead him to a conclusion in its favour; and it has been known he has been closely studying vertical retort constructions and results from well before the time when he spoke upon them at the Glasgow meeting of the Institution in 1911. The new retorts (which will, with present Derby results, have to make a good showing to justify their adoption and existence) are to be erected at the Cavendish Street works of the Company. At these same works, readers will remember, the first installation in this country of De Brouwer stoking machinery was put into operation. If the same success attends the installation of the Wilson-Glasgow verticals, the Directors of the Company and their Engineer will have no reason to regret their further pioneer work.

A Murdoch Letter.

While so much new history is in the making, it affords a welcome relief to turn for a minute or two now and again to that which has already been made; and an excellent opportunity for doing this was afforded a fortnight ago by Mr. R. B. Prosser, a letter from whom was published in our pages, in which he offered to forward to those interested (so far as the supply would go round) a few copies he had left of a letter from Murdoch to a Member of Parliament—reprinted for private circulation on the occasion of the Centenary of Gas Lighting in 1892. The letter was written on May 4, 1809; and the object of the writer was to vindicate his character and claims, in reply to a publication "by the Committee for Conducting through Parliament a Bill for Incorporating a Gas Light and Coke Company." In a prefatory note, Mr. Prosser remarks that he decided that the letter was worth reprinting, because of the fact that it seemed to have escaped the notice of all the writers on the subject. An insinuation that he had been anticipated by a Dutch or German chemist named Diller, made Murdoch very indignant. In fact, right through he writes with considerable warmth; and just what was in his mind is clear from the part in which he says he never did pretend to the discovery of the inflammable principle of gas from coal, and then goes on: "I willingly admit that the question is as to the first application of the gas as an economical substitute for oils and tallow, in the production of light for public and private purposes. This is what I have claimed, and for which I have been honoured with the Royal Society's gold medal—disgraced, I should rather say, if I have no claim to the merit thus imputed to me." Murdoch was represented before the Committee to whom the Bill was referred, though he did not himself give evidence. The measure was thrown out; but another Bill introduced in the next session was more fortunate.

Commercial Intelligence.

The activity of the Commercial Intelligence Branch of the Board of Trade, in their efforts to assist the industries of the United Kingdom, is exemplified in a rapidly growing list of pamphlets which bear the heading "Competition with Germany and Austria-Hungary in Neutral Markets." Already no less than thirty-five of these pamphlets have been issued, each one dealing with a particular branch of industry. The idea, of course, is to point out the directions in which, and the extent to which, there are openings for British traders to secure business that has been in the hands, or was likely to go into the hands, of "enemy countries." The memoranda cover so wide a range that most manufacturers must find something of use to them in one or more of the pamphlets. The list of subjects dealt with is too long to reproduce here; but the nature of the information afforded will be gathered from the notice of the pamphlet relating to exports of certain descriptions of internal combustion and explosion motors, gas-engines, turbines, &c., from Germany and Austria-Hungary, which appeared in the "JOURNAL" a fortnight ago, and that of the one on tubes, pipes, and fittings of iron and steel which will be found on another page of to-day's issue. For the benefit of those who are wishful to study the documents themselves, it may be mentioned that copies of the two specially alluded to here, or of any of the others so far issued, can be obtained on application to the Director of the Commercial Intelligence Branch of the Board of Trade, No. 73, Basinghall Street, E.C.

Drastic Legislation.

A further move in the direction of dealing with the situation brought about by the European conflagration was made by the Government last week, when a Bill was introduced into the House of Commons by the Attorney-General which makes provision with respect to penalties for trading with the enemy, and other purposes connected therewith. The Bill consists of only four clauses; but there are a large number of sub-sections, which make it quite a lengthy document. The importance of legislation of this character is generally recognized; and no doubt the terms of the Bill will be carefully studied by those concerned. Referring to the tremendous power wielded by the economic weapon in a struggle like the one in which the country is now engaged, the "Financial News" remarks that "as between the economic and military methods, supposing that either can be carried on by itself, the former is the more potent, though the latter is the more prompt." The provisions of the measure (as will be seen elsewhere in this issue) are stringent; but at the same time it has been made clear by the Attorney-General that there is no wish that the restrictions should operate unfairly. As he pointed out, "it is a matter not only of commercial good faith, but of good business, to make it plain to private citizens that their reasonable commercial interests and vested rights in this country are safe." What is really aimed at is to prevent the transmission of money (or goods) to enemy countries—and this even though the payment might arise from a contract entered into before the war began. The rules that must be observed in the matter were set forth in a Proclamation issued some little time ago; but this has now been superseded by

another, which puts the matter more clearly, and prohibits certain transactions which were not forbidden in the earlier one. This new Proclamation we reproduce, as it is well that its terms should be noted by all and sundry.

Patents of Alien Enemies.

Allusion was made a fortnight ago to the Patents, Designs, and Trade Marks (Temporary Rules) Act, 1914, under which the Board of Trade may, on the application of any person, and subject to such terms and conditions as they may think fit, order the avoidance or suspension, in whole or in part, of any patent or licence granted to subjects of enemy countries, or the registration of any trade mark the proprietor of which falls under the same designation. The "Official Patent Journal" dated last Wednesday contained a list of fourteen patents in respect of which proceedings to "avoid or suspend" are being taken. The subject-matter of these patents ranges from paraoxyarylarsinic acids to artificial teeth. Approximate dates of hearing are given; and it is intimated that any person desiring to be heard in opposition to the applications must give notice in writing to the Comptroller-General of the Patent Office before the dates named—which are all between now and the middle of next week. Until these cases have been heard, it is, of course, impossible to say on what lines the Board of Trade will proceed in dealing with them; and the decisions in these first hearings will be eagerly awaited by those contemplating the taking of similar proceedings. In the course of a well-reasoned article, a correspondent of "The Times" expresses the opinion that in regard to applications for the avoidance or suspension of patents, or for licence, where plant that is more or less expensive has to be laid down, it is possible that the Board may grant perpetual licences, and that at the conclusion of the war the original owner will only be allowed to resume his rights subject to this limitation; but that, generally speaking, it is unlikely that any steps will be taken which will imperil the rights of British proprietors of patents, designs, or trade marks registered in the enemy States.

The Moratorium and Gas and Water Accounts.

Unless the moratorium is extended beyond Oct. 4, it will not affect to any material extent the payment of gas accounts, save indirectly where, through the operation of the moratorium, some gas consumers are short of ready money. A "Legal Contributor" of the "Electrical Review," writing on the subject, says: "With regard to goods sold and delivered prior to Aug. 4, the price cannot be recovered until Oct. 4, if it is more than £5. Where, however, a customer has had a trading account with a firm which allows him credit, and his bill amounts to (say) £49 6s. 3d., made up of different items in respect of goods ordered and delivered on various dates prior to Aug. 4, it is conceived that, while the items over £5 could be sued for and recovered notwithstanding the moratorium, those under the amount could not be recovered. Each purchase must be regarded as a different transaction." Referring to payments that are excepted from the moratorium, he incidentally remarks: "It will be observed that gas and electric lighting charges are not excepted. They cannot be said to come under the head of rates and taxes. As such charges in so far as they relate to gas and electricity supplied before Aug. 4 do not become due till Oct. 4, it is conceived that an authority could not cut off the supply, and by that means enforce payment, until after that date." It will all depend on the decision as to the further extension of the moratorium as to whether it will affect collections. But as postponed payments, for which specific demand has been made, carry interest at the Bank of England rate from Aug. 4, or the date on which they become due, this will anyway assist in the promotion of collections, and prevent any undue advantage being taken of the privilege conferred by the moratorium.

Coal Exports.—The exports of coal from the United Kingdom in the eight months ended last month (the expression "coal" including also coke and patent fuel) amounted to 46,276,159 tons, as compared with 50,396,630 tons in the corresponding period of 1913, and 41,246,156 tons in 1912. Coal was also shipped from the United Kingdom for the use of steamers engaged in foreign trade to the extent of 13,249,027 tons, as compared with 13,720,560 tons and 11,608,744 tons. Thus in one form or another, coal left the shores of the United Kingdom in the first eight months of this year to the aggregate extent of 59,525,186 tons, as compared with 64,117,190 tons and 52,854,900 tons in the same period of 1913 and 1912.

PERSONAL.

At a meeting of the Gas Committee, whose minutes were confirmed by the Southport Town Council last Tuesday, a resolution was passed placing on record appreciation of the services rendered by Mr. J. BLUNDELL during the time he has served the Corporation, and also expressing congratulations on his success in obtaining the appointment of Gas Manager to the Macclesfield Corporation, and best wishes for his future career.

Mr. CHARLES LOVERIDGE, the Engineer and Manager of the Wolstanton Urban District Council Gas-Works, was the recipient of a case of silver fish-eaters, subscribed for by the staff and employees, on the occasion of his recent marriage. The presentation was made by Mr. G. J. Mear, the Secretary. The company were afterwards entertained by Mr. Loveridge; the toast of the health of Mr. and Mrs. Loveridge being heartily honoured.

It was intimated in our news columns last week that Mr. C. H. CARDER had been given the position of Gas Manager to the Oldbury Urban District Council, owing to the continued severe illness of Mr. A. Cooke. Mr. Carder, who was appointed Assistant Engineer and Manager to the Bath Gaslight and Coke Company about a year ago, prior to that occupied for seven years the position of Assistant to the Engineer of the Cardiff Gas Company He served his articles with Mr. Sidney O. Stephenson at Tipton, and was for two years afterwards Assistant there. He was also associated with the South Staffordshire Mond Gas Company during the construction and testing of their works. Mr. Carder, who is a Public School man, has had wide experience of constructional and administrative work.

At a meeting of the Directors of the Sunderland Gas Company on the 9th inst., Mr. W. LIVSEY ROBERTSHAW was appointed Works Manager of their Ayre's Quay works, to act under the Engineer, Mr. C. Dru Drury. Mr. Robertshaw served his articles with Messrs. R. & J. Dempster, of Manchester, and afterwards remained with them as an assistant in their engineering department. Mr. Robertshaw then held the appointment of draughtsman and clerk of works to Mr. William Belton, the Engineer of the Shrewsbury Gas Company, for a period of three years, where, under the Engineer's supervision, he was responsible for the whole of the work in connection with the construction of the new works there. Upon the completion of the Shrewsbury works, he accepted the appointment of Assistant-Manager to the Parà Gas Company, North Brazil, where he remained for two years. In 1912 Mr. Robertshaw was appointed Chief Draughtsman to Mr. Drury, at Sunderland, and under his supervision was responsible for the drawings, specifications, bills of quantities, and the supervision of all constructional work in connection with recent large extensions at their Hendon works.

The appointment of Engineer and Manager of the Tipton Urban District Council Gas-Works (to succeed Mr. Sidney O. Stephenson, who goes to Worthing) has been given to Mr. WILLIAM PRINCE, who has for about twenty years occupied a similar position at Stoke-upon-Trent, from which he is retiring owing to the federation of the six towns, and the unification of the heads of the various departments. For ten years previous to going to Stoke, he was at the Darlington Corporation Gas-Works, where he received his training under Mr. William Smith, who subsequently became Engineer and Manager of the Bolton Gas-Works. Mr. Prince, who is 47 years of age, was in 1896 elected a member of the Manchester District Institution of Gas Engineers, and eleven years later filled the office of President. He also served on the Executive Council of the Institution of Gas Engineers during the five years from 1907 to 1912. Much construction work has been carried out by him, the Stoke works having been practically rebuilt from his designs and under his guidance and advice; and his certificates include chemistry, building construction, and steam. He also won two Queen's Prizes for finished architectural drawings.

Canadian Gas Association.

The Canadian Gas Association are holding their annual meeting this week in Ottawa—on Thursday and Friday. Among the papers promised are the following: "Purification of Gas—Switching-on the Foul-Box Last," by Howard E. Mann, the Engineer of the Montreal Light, Heat, and Power Company. "Notes on Condenser Design," by Mr. Haug, the Assistant Engineer of the Company. "Gas-Fired Steam-Boilers," by H. E. G. Watson, of Toronto. "Commercial Lighting," by W. Kennedy. "Advertising to Sell Gas," by Geo. W. Allan. The authors of the last two papers are connected with the Toronto Consumers' Gas Company, as the Superintendent of the New Business Department and Advertising Manager respectively. Yet another paper (title not so far known) will be contributed by Mr. M'Intyre, of the Ottawa Gas Company.

Examination of London Water.—We have received from the Clerk to the Metropolitan Water Board (Mr. A. B. Pilling) the eighth annual report on the results of the chemical and bacteriological examination of the London waters, embracing the twelve months ended March 31 last, by Dr. A. C. Houston, the Board's Director of Water Examination. It was accompanied by Dr. Houston's tenth report on his research work. The reports are published by Charles Straker and Sons, Bishopsgate Avenue, E.C.

DEATH OF MR. WALTER HUNTER.

We regret to record the death last Wednesday, in his seventy-fifth year, of Mr. Walter Hunter, whose name will be remembered by many readers in connection with the construction of the large water reservoirs at Staines, and who was also well known in gas circles.

Mr. Hunter was the Engineering-Director of the Grand Junction Water Company before their undertaking was acquired by the Metropolitan Water Board; and during the inquiry into the water supply of London, conducted by Lord Balfour of Burleigh rather more than twenty years ago, he submitted, in conjunction with Mr. Fraser, the Company's Engineer, a scheme for the construction of a series of reservoirs in the Thames Valley. The scheme received the approval of the Commission; and it was decided to make a commencement with it by constructing, at Staines, reservoirs to hold 3300 million gallons of water. The work was undertaken by a Committee specially formed for the purpose, consisting of the Grand Junction, New River, and West Middlesex Water Companies. Parliamentary sanction was obtained, and the work was duly carried out by Mr. Hunter, in collaboration with Mr. Reginald E. Middleton, M.Inst.C.E., at a cost of about £1,250,000 sterling. On the water undertakings being acquired by the Metropolitan Water Board, Mr. Hunter passed into the service of the new body; but he retired after a few years, and practised as a Consulting Engineer in Westminster, the style of the firm being Hunter, Duff, and Middleton. He gave evidence on the arbitration proceedings in connection with the transfer of the water undertakings to the Board, as well as on their applications to Parliament for additional powers.

Mr. Hunter was associated with some gas undertakings, and for twenty years has been an exceedingly valuable member of the Board of the Commercial Gas Company, of which he became Deputy-Chairman in 1900. During all this time, until last July, he seldom missed a Directors' meeting. But two months ago he had a seizure, which was followed by another on Monday of last week at his office. This necessitated his removal from Victoria Street to a neighbouring hospital, where he died, as stated. His other directorships included a seat at the Board of the Regent's Canal and Dock Company.

High professional attainments, combined with an attractive personality, secured for Mr. Hunter a successful business career. At one time, he was extremely well known in East London, being a member of the engineering firm of Hunter and English, Limited, at Bow; and twenty years ago he took a prominent part in local government in Bow and Poplar. He had, for a long period, been a Justice of the Peace for the Tower Hamlets, and a member of the Institution of Civil Engineers. He came of an old Bow and Bromley family, and resided for many years in Bow Road, where most of his family were born.

The Late Mr. Howlett.—Alderman George Howlett, of Vauxhall, who was the principal coke contractor for the South Metropolitan Gas Company, and whose death, at the age of 71, was recorded in the "Journal" for Feb. 17 last [p. 418], left estate of the gross value of £34,835.

Bland Porcelain Burners.—Porcelain inverted burners possess an advantage from the fact that they can be chosen to harmonize with the fittings of the room in which they are used; and the Bland Light Syndicate, Limited, of Queen Victoria Street, E.C., are now making their well-known British-made burner in this style in very pretty shades. The material employed is a new fireproof porcelain; and the colours are rich brown, jade green, or white with gold lines. The burners also have a handsome appearance in polished brass with coloured porcelain shell, and steel bronzed or antique copper with white porcelain shell.

Aniline as a Coal Solvent.—In a recent number of the "Bulletin of the Société Chimique de France [No. 12; 1914], M. Léo Vignon dealt with the subject of solvents of coal. He showed therein that aniline can be used to differentiate chemically coals known technically as fat, semi-fat, and thin. The first contain relatively large, and the last comparatively small, quantities of substances soluble in aniline. These substances are precipitated by acids. If the insoluble portions and the substances precipitated in their solution are compared, it is found that the soluble portion is richer in hydrogen and poorer in ash. Boiling quinoline extracts a considerable quantity of material from fat coals.

Death of Mr. A. Dowson.—The death occurred on Aug. 14 of Mr. Alfred Dowson, formerly in practice as a civil engineer in Westminster. For nearly a quarter-of-a-century he was actively engaged in the design and construction of engineering works on the sea coast; but in 1870, on the passing of the Tramway Acts, he carried out several tramway schemes in this country and in India. In conjunction with his brother, Mr. J. Emerson Dowson, he published, in 1875, a treatise on "The Construction of Tramways." He ultimately gave up his sea work to fill the position of Engineer to the Dowson Economic Gas-Power Company, subsequently taking charge, until his retirement in 1908, of the Company's works at Basingstoke. Deceased was greatly interested in sanitation problems, and was for many years a Fellow of the Royal Sanitary Institute.

THE GAS INDUSTRY AND THE WAR.

At a meeting of the Co-Partnership Committee of the Gas Light and Coke Company (presided over by Sir Corbet Woodall), it was resolved unanimously that the Committee recommend the formation of a fund to be called "The Gas Light and Coke Company War Distress Fund;" that, with this object, co-partners be asked to agree to a deduction from their co-partnership bonus during the war amounting to 1¼ per cent. (one-quarter of the present rate of bonus); and that the fund so created be administered by the Co-Partnership Committee. The Governor notified the intention of the Directors to subscribe to the fund; and it was agreed to invite employees of the Company not being co-partners also to contribute. It may be pointed out that, in the accounts of the Company issued last July this item appeared—"Co-partnership, for twelve months to June 30, 1914, £45,653."

A telegram from abroad appeared in the London Press early last week to the effect that "the Berlin Gas Company, which is an English concern, has been taken over and placed under State administration." Communication with Berlin is, of course, at the moment somewhat difficult; but pending the receipt of some more definite information than is contained in this message, shareholders in the Imperial Continental Gas Association will probably conclude that, if any steps have been taken by the German authorities, it has been with the idea of safeguarding so essential a thing to their Capital as the gas supply.

The Secretary of the Admiralty last Wednesday communicated the following statement for publication: "For the general safety of the community, the country being at war, municipal authorities are requested to reduce as much as possible the number of powerful lights on piers, esplanades, and public places which are visible from seaward or from the air."

Closely following this came a notice by the Commissioner of Police of the Metropolis dealing with the same matter: "In order to render more difficult the identification of particular parts of London, it is requested that arc lights, sky-signs, illuminated fascias, and powerful lights of all descriptions, used outside for advertising or brilliantly illuminating shop-fronts, be dispensed with. Where the front-shop consists of a considerable area of glass brilliantly lit from inside, a reduction of lighting intensity should be effected. This request is made in connection with the observation of London lighting from above that will be made by a naval airship." In compliance with this, the lighting of many of the large shops was much reduced, and measures were taken to obscure what lights were necessary. Pedestrians have missed, too, the light from many of the street-lamps.

Speaking in the Bristol Town Council upon a subject about which many people have been much exercised, Alderman Pearson said he was sorry they were obliged in some measure to curtail the arc lighting. This had been brought about by the policy in this country of buying in the cheapest market. The carbon manufacturing business had gone almost exclusively into the hands of Germany; there being only one big works in England. At present the Government had not commandeered the Corporation's stock of carbons; but the suggestion had been made that they should curtail the use of them for the moment, or substitute incandescent for arc lamps. Something had been done by switching off one-half of the lamps at an earlier hour. They had at least a four months' stock of carbons on hand; but what had happened would be a lesson to him, and he hoped to other people, that there was an advantage in supporting home industries, even though at the moment one paid a little more than elsewhere.

Money is still flowing in to the Prince of Wales's National Relief Fund. Here are some of the latest contributions: Fife Coal Company, £1500; British Westinghouse Electric and Manufacturing Company (donation from staff), £350; Blyth Gas Company, £210; Oswestry Gas Company, £105; Otto Coke-Oven Company, £105; Sutton District Water Company, £100; Stretford Gas Company, £50; Lewes Gas Company, £21; Montrose Gas Company, £20.

Some days ago a deputation from the Association of Municipal Corporations waited on Mr. Lloyd George at the Treasury, to submit resolutions asking that advances of money from the Government war loan should be made to the corporations at cost price, in order that the new capital for municipal undertakings might be secured upon the best possible terms; and also that the application of the Trustee Act should be widened. In the course of his reply, the Chancellor of the Exchequer said it was obvious that it was to the interests of the municipalities and of the State that they should not be competing in the same market in what must be difficult borrowing times. It was desirable to accede to the deputation's request that whatever money they borrowed for the purpose of responding to the invitation of the Local Government Board to make provision for distress in their districts should be advanced out of the war loan that the Government put on the market. With regard to terms, he thought they must be subject to the same time obligations as the Government, who were quite

prepared to lend at the rate of interest they themselves paid, with an allowance for the actual expenses to the State. He added, however, that in the opinion of the Government it was absolutely necessary that the money should be spent for the relief of distress. This was not the time to embark on great municipal enterprises which had no reference to distress. Resources must be husbanded; the Government did not want a penny spent which was not absolutely essential to relieve distress, because, after all, if the corporations entered a market it was the same market that the Government went into.

At a meeting of the Oldham Gas Committee, it was reported that 22 servants of the Gas Department had left to join the Colours. The Mayor (Alderman Wilde) said that their General Manager (Mr. Arthur Andrew) was of opinion that there were many young eligible men who were deterred from joining because of family and other considerations, who would join if they felt that their position would be safe if they were spared to come back; and they wanted to know, on the other hand, if some provision would be made for their dependents. He (the Mayor) did not agree with the way they treated single young men unless they had some dependents. They now gave them nothing at all. Many young men getting from 35s. to 40s. per week, being careful, would save 10s. per week, or £26 per year. For what a single man would lose, they ought to do something—say, 5s. per week if he had no dependents; and this might accrue until he came back. Mr. Griffiths thought 5s. was too little, as they were asking the men to make a sacrifice in their wages, and perhaps of their lives. Mr. Andrew said he should pay them half wages. During the time they were away at the war, there might have been a chance of promotion. A resolution that half wages should be paid to single employees who volunteer for active service was passed; and the Mayor will now bring the matter before the Special Committee dealing with the question.

At the half-yearly meeting of the Stretford Gas Company, it was unanimously decided to contribute £50 to the National Relief Fund, and power was given to the Directors to contribute any further sums up to £100 at their discretion. The shareholders were also informed that the Board had offered to pay half-wages up to 15s. to any man called up to the Colours, or volunteering for active service, and, in addition, would guarantee the position when he returned, and pay any premiums due on the personal life assurances of the men. Eight men have gone, and at least an equal number are expected to go shortly. In addition to the above, a weekly subscription to the National Relief Fund has been started among the staff and employees. The first week's contribution amounted to £3 0s. 8d.

At a meeting of the office staff and workmen of the Mansfield Corporation Gas and Water Department (presided over by Mr. W. J. Rendell Baker, the Engineer and Manager), it was unanimously decided that each employee should contribute to the Relief Fund, for every day that he works, in the following proportions: Where the weekly wages average about £1 per week, 1d. per day for each full day's work, and under £1 per week, ½d. per day. The General Purposes Committee have recommended that in the case of any workman on active service his wife shall receive 10s. per week and 1s. for each child, while the war lasts.

Mr. M. S. Blaker, the Chairman of the Lewes Gas Company, informed the shareholders at the half-yearly meeting that fourteen of the employees had gone to the war; and in the cases where those who had gone had persons dependent upon them the Directors proposed to make some allowance during the men's absence, and to keep places open for them. A resolution was passed by the meeting sanctioning the subscription of 20 guineas to the National Relief Fund.

Nine of the employees of the Dover Gas Company have already been called up for active service; and others are likely to follow. The Directors will see that the wives and all dependents are adequately provided for during the absence of the men, who will be reinstated on their return.

A highly successful meeting of the Lichfield Committee for the Relief of Distress was held last Tuesday, at which a number of communications were read. In sending a cheque for £20 to the fund, on behalf of the Lichfield Gas Company, Mr. F. Key (the Manager) stated that they had eight men called up for military service; and the Directors had decided to allow each man's wife 8s. per week and 1s. 2d. for each child per week up to five children, or a maximum of 13s. 10d. per family, and a bonus for single men without dependents. Their remaining employees—that was, the whole staff—had agreed to contribute 1d. per week for every 10s. received in wages to the National or Local Relief Fund, so long as it might be required. This would amount to 5s. per week, and was a good means of obtaining the smallest contributions.

The Stalybridge Town Council last Tuesday decided to suggest to the Local Government Board to allow local authorities to postpone for one year their statutory obligations relative to the redemption of loan debt and annuities, and also to extend for one year the period for repayment of loans and annuities already sanctioned and borrowed. Mr. Storrs explained that the application really amounted to a moratorium for one year, and it was justified by the exceptional financial conditions occasioned by the war.

The Darwen Gas Committee were notified by the General Purposes Committee last Tuesday that it had been decided to recommend that in the case of the wife of any employee called up for service who has children, the Council should undertake to make up his separation allowance to three-fourths of his present pay, with a minimum of 20s. per week; and that in the case of any employee called up for service who has no children the Council should undertake to make up his separation allowance to 5s. less than three-fourths his present pay, with a minimum of 15s. per week. It was also decided that no allowance be made to unmarried men, except in cases where there are persons dependent upon them, and that these cases be referred to the Mayor (Alderman J. Tomlinson) and Mr. Parkington. The places of all such employees will be kept open for them until the end of the war.

At a meeting of the employees at the Chesterton Gas-Works of the Wolstanton United Urban District Council, it was unanimously resolved that each man should contribute 3d. a week to the National Relief Fund; the amount to be deducted from his wages.

In connection with the Distress Fund which is being raised by the Mayor of Pudsey, the Pudsey Gas Company have made a contribution of £25. The East Ardsley Gas Company have made a first contribution of £10 10s. to the Ardsley (East and West) Distress Fund. The Bridlington Gas Company contribute £21 to the Mayor of Bridlington's Fund for the relief of local distress.

At last Wednesday's meeting of the Ashton-under-Lyne Town Council, it was decided to pay half-wages to the families of municipal employees who have joined the Army and Territorial forces.

Messrs. William Sugg and Co., of Westminster, state that 46 of their men have joined the Colours, representing 10 per cent. of the employees. To those who were called up, the Directors have agreed to pay half their weekly wages while at the war, and to reinstate them on their return. To all single men joining Lord Kitchener's Army they have decided to pay 7s. 6d. a week while the war lasts, and reinstate them on their return. The remaining employees are contributing weekly to the Prince of Wales's Fund.

The employees of Messrs. J. & J. Braddock, of Oldham (a branch of Meters Limited), held a shop meeting last Thursday evening—Mr. G. H. Braddock presiding—to institute systematic and regular help for the funds for the relief of distress. The meeting resolved to institute regular weekly collections, journeymen to pay 6d. in the pound and labourers 3d. in the pound on their wages; and that the collections be paid as regards 75 per cent. to the local fund and 25 per cent. to the national fund. Besides subscribing £200 to the Prince of Wales' National Relief Fund in Manchester, the firm of Meters Limited throughout their branches are making grants not exceeding 10s. each per week to the wives of married men on active service, with 1s. extra for each child, and to the dependents of single men an amount varying according to circumstances.

The members of the staff and works of the British Thomson-Houston Company, Rugby, Willesden, and Coventry, are answering the call of their country in a whole-hearted manner. So keen is their patriotism that up to the present 900 have enlisted; this number representing over 50 per cent. of the eligible male adult employees. The Company intend to pay half wages to all the employees who have enlisted, and promise wherever possible to reinstate returning employees in their former positions on the cessation of hostilities.

The Oldham Gas Committee, at their meeting on Wednesday, decided to cancel the remainder of an order for certain material manufactured by a German firm. The firm had stated that they were unable to fulfil their contract at present, but promised to assist the department should they require any other material.

Last February the Bradford Corporation Electricity Committee accepted a tender of the Adnil Electric Company, Limited, of London, to supply and erect a turbo-generator manufactured by the Bergmann Electrical Works, of Berlin; the price agreed upon being £9370. The generator was nearly completed when war broke out. The Committee have now decided to re-let the contract to the British Westinghouse Electrical Manufacturing Company, of Manchester.

One member of the "JOURNAL" staff has left London *en route* for the front, and another (a junior) is undergoing training with the same good object. But there is no intention on that account of discontinuing the issue of the "JOURNAL" during the period of the war, as appears to be the case with two of our French electrical contemporaries. Anent this stoppage, "Electrical En-

gineering" publishes this paragraph: "We have received a post-card from our Paris contemporary, 'La Lumière Electrique,' as follows: 'In answer to your letter of the 25th, we let you know that we have ceased to issue our paper since the beginning of the war, first of August, all us being gone to the army.' We are also informed that 'l'Electricien' has suspended publication until the close of the war."

In view of the discussion that has been going on in certain quarters, it may be mentioned that a few days ago the "Evening News," in giving particulars as to the source of the capital of certain gas-lighting appliance firms, made the statement that the Bland Light Syndicate, Limited, of Little Trinity Lane, E.C., consists of "all English shareholders." It is a fact that the capital employed by the Syndicate is British; and, moreover, the "Bland" burner and outdoor lamps and brass-foundry work are entirely British made, by British labour.

On behalf of a Sub-Committee authorized to deal with the question, the Mayor of Heywood recommended that the wages of the employees in the gas and other departments who had been called to serve with the local Territorials should be made up in full, after taking into account all allowances due to them from the Army Department. The recommendation has been unanimously approved by the Finance Committee.

The effort of the Engineers' Club, Manchester, which numbers many prominent Lancashire gas engineers among its members, to raise a battalion for Lord Kitchener's Army is, states our Manchester correspondent, already meeting with much success. As a result of recent local newspaper announcements, many eligible young men presented themselves at the club, Albert Square, on Wednesday morning; and about noon the number was approaching a hundred. It is not, therefore, anticipated that there will be any difficulty in securing a full battalion, having regard to the number of strapping young men engaged in the Manchester engineering trade. Circulars are being sent out to employers and employed.

The Penrith Urban District Council have decided to provide and fix free of charge gas-stoves in any temporary hospital under the Red Cross Society which may be established in the town.

United Water Softeners, Limited, of Imperial House, Kingsway, W.C., request us to state that the Company, who are the largest manufacturers of water softening and purifying plants in the United Kingdom, have no connection in any shape or form with Germany, German subjects, or German products; and no interest or control, either financial or managerial, is held in this Company by Germans. The Directors are: Arthur O. Burton, London (British); L. A. Neel, London (British); S. Henry Menzies, London (British); V. Hjort, London (Danish); and J. J. Lassen, London (Danish, naturalized in Great Britain). The water softening and purification plants, in which the Company exclusively deal, are all manufactured in Great Britain by British workmen, and the technical and clerical staffs are entirely British. All rights in the "Permutit" patents are under the sole and exclusive control of this British Company.

While a number of men of the Essex Royal Horse Artillery were bathing in the Deben at Kyson, near Woodbridge, Bombardier Smith was carried away by the tide and sank. Lieutenant Flannery (son of Sir Fortescue Flannery, one of the Board of the South Suburban Gas Company), Sergeant Ward, and others made a gallant effort to save Smith, but without avail.

LIGHTING OF LONDON IN WAR TIME.

[From a Correspondent.]

Apart from the order issued by the Chief Commissioner of Police towards the end of last week, requesting that powerful lighting should as far as possible be dispensed with,* it was quite obvious to the careful observer of the streets after nightfall that something was happening to the lights of London earlier in the week, or as far back as the previous week end, when the public lamps, both electric and gas, in the centre and the west-end were reduced by 50, and in some cases close upon 75, per cent. This seemed to have been carried out by the extinguishing of every other lamp in the streets—the electric lamps being run on alternate circuits; while blocks of lamps in some of the leading thoroughfares that cannot be mentioned were missing. The high-power gas-lamps that are now such a feature in our important roads, where lighted with multiple burners, were reduced to one burner per lamp, reducing the candle power of the lamps correspondingly.

It is well known to those who have, during the last few years, since the advent of the high-power gas-lamps and the flame arc-lamps, to say nothing of the well-known illuminating signs and automatic lighting advertisements, looked down on the Metropolis, from (say) the heights of the northern suburbs at Highgate or Hampstead, that the main roads after sunset have appeared like rivers of beautiful light. In fact, there is an illuminated map of London—to a scale, of course, "full size"—so that it is possible to pick out with ease certain localities or trace a path from east to west, or north to south. This is rendered all the more easy by the well-lighted bridges; while the electric trams and motor omnibuses form an unbroken stream of moving light.

It is evidently thought wise to break-up the continuity of these lanes of light and destroy the identification of many of the well-known and most brilliantly lighted centres; for on making a tour of the Metropolis on Thursday night, when we were told by the authorities that a Navy airship would be taking observation with a view to finding out what spots would be most likely to attract attention from above, it was found that London was in comparative darkness. All the well-known private and public illuminations were missing, so thoroughly had the local authorities obeyed the bequest of the police. The London County Council had drawn down all the blinds of the tramcars, which were running with half lights; the well-known double and triple burner low-pressure inverted gas-lamps were burning with only one burner (and not many of them at that); the high-pressure lamps in the main roads had all but disappeared; while the bridges had only sufficient light to enable traffic to cross in safety. Some thoroughfares had whole blocks of lamps, extending nearly a quarter-of-a-mile, dead-out. The same may be said of certain centres and important crossings. So well had the authorities succeeded in "dousing the glim," that old stagers in London were a bit troubled in finding their way about. In the centre, the new centrally-suspended and other lamps were given a black night-cap which effectually hid all escaping rays that had an upward tendency, while they (what few there were) threw a patch of light just sufficient to make driving safe, if care were exercised, for the motor omnibuses and taxi-cabs.

In sharp contrast to this were the rays of the searchlight ever and anon flashing across the darkened City. The streets were made all the darker from the fact that all outside shop and parade lighting was also extinguished, including the large lamps which are such a feature outside the public houses. The police are certainly to be congratulated on having thoroughly destroyed the contour of the Metropolis at night as it was known before the outbreak of war.

* This order is reproduced in our "War Notes" to-day.—Ed. J.G.L.

NATIONAL RELIEF FUND.

To H.R.H. THE PRINCE OF WALES,
BUCKINGHAM PALACE, LONDON.

I beg to enclose £ s. d. as a donation to the National Relief Fund.

Name.....

Address.....

.....

The envelope containing this coupon need not be stamped.

ELECTRICITY SUPPLY MEMORANDA.

Gold Exports.

THE British electrical industry seems to have been almost stunned with surprise over the revelations that have been made recently as to the extent that German enterprise has planted its feet in its very midst, and as to the degree that (probably unwittingly in many cases) the industry has been contributing unnecessarily to the wealth of Germany, and so indirectly to the funds which are now being unsparingly dissipated in trying to shatter the strength of Great Britain and its allies, as well as to bestow upon militarism a despotic control over civilization and humanity. The electrical industry has offered fertile land for the promotion of companies with "British," "Union," and other words as part of their designations which hide the identity of the capitalizing and profit-sharing constitution, and enable the concerns in question to sail under false colours. Certain evening and financial papers have been unearthing at Somerset House some of the structural facts concerning certain of these companies; and Government Departments are on the same job. There has been disclosure of the fact that a considerable part of the capital is either held in Germany, or the bulk of the shareholders who may be resident in this country bear names that are not British. Blood is ever thicker than water; and compatriotism has agglutinizing properties. Various electrical concerns, too, that were of British origin have been purchased by German capital. It is not a rational thing, however, to attack firms indiscriminately because of German origin. If the works are situated in this country, if the employees are British, if the money made is spent for the most part here as wages, for materials, and in other ways, there is a difference. It is not the same thing as sending orders to Germany for plant or other goods that can be as well made in this country, if the sale price is reasonable.

Qualifications and Other Points.

We quite agree with the "Electrical Times" that there are two sound reasons for buying abroad. One is if the necessary material cannot be procured in this country, and the other is if British goods are offered at a price which denotes trade tyranny. There must be international trading if the world is to be kept at the highest level of efficiency and prosperity; but the limits of international trading should be fixed as far as possible by national or collective need and economy, and national or collective economy cannot be served (qualifying this by the foregoing considerations) by sending contracts and money out of the country that could be utilized to give employment to labour and capital within it. The prosperity of Germany has been largely due to the loyalty of its people to its own manufactures, and to the systematic development of business abroad. Germany has provided a great commercial exemplar for this country, which is—the electrical industry included—inclined to profit by it while chance of the golden order lies in its path. Certain it is that, after the war, there will be an awful row in municipal bodies—and municipal bodies own a large proportion of electricity supply works—if the patronage of German-made goods is continued when British-made ones are available. "Electrical Industries" has been putting in the pillory the Gillingham Corporation Electricity Department for having patronized an electrical company with its capital of £20,000—nine £1 shares in which are divided among nine gentlemen mostly with names that are not British, but who are resident in this country, while 19,991 shares are held by the Allgemeine Elektricitäts Gesellschaft, which is not English. Regarding companies having shareholders resident in Germany, a correspondent of the "Electrical Review" contends that anyone who now gives work to these companies is acting illegally, seeing that the Royal Proclamation of Aug. 5 contains a clause to the following effect: "Nor to enter into any new commercial, financial, or other contract or obligation with, or for the benefit of, any person resident, carrying on business, or being in the said [German] Empire"—a pretty comprehensive clause.

"The Last Word."

All new electric cooking apparatus that is brought out is better, so the manufacturers say, than anything precedent; and according to the Brompton and Kensington Electric Accessories Company they have now the very best thing in the way of electric cookers. In fact, the Company assert that what they have done has been to bring their cookers up to a point beyond which it is difficult to suggest improvement, and their efficiency shows a material advance on many other electric-cookers on the market. This would be very bad for all else that has ever been invented in this line; but, as it happens, the same thing has been heard repeatedly the last few years. If what is now said be true, there ought to be a royal scrapping going on. The scrapping has begun—by (what more natural?) the B. & K. Accessories Company. The concern is an offshoot of the Electric Supply Company operating in the Brompton and Kensington areas. The Accessories Company have a restaurant in the Earl's Court Road, which, when it was fitted up, was heralded as being unsurpassable in completeness and efficiency. But fifteen months later, if we are rightly informed, sees the main appliances discarded in favour of new, because the period has brought to light weak points and undesirable features in the apparatus originally installed. In the cookers which the Company have designed for themselves, they have (so it is said) taken steps to eliminate all the defects discovered—which quickly revealed themselves—during their fifteen months' experience with the restaurant. Now they come forward as competitors of all other makers, and are willing to supply hotels, restaurants, houses, and, in fact, any premises that require a cooking installation. All appliances, before being placed on the market, are (it is said) subjected to rigorous tests and criticisms by expert chefs in the employ of the Company; and this statement is succeeded by one which informs us that the most delicate or severe cooking operations can be carried out to perfection in B. & K. ovens without special knowledge. We think the latter is the more "rigorous" test.

The Domestic Cookers.

The B. & K. domestic cookers are described by most of the electrical papers. The cookers are put forward "with every confidence as reliable and efficient, and unlikely to give trouble or to call for any expenditure for upkeep over a long period." The word "unlikely" is a meet qualification of the asserted reliability and efficiency. It denotes possibility, and that there will be no surprise if trouble is experienced and expenditure called for. The parts are all interchangeable, as in modern gas-cookers, only that there are more parts and more expensive parts in the electrical adventurer, the description of which parts occupies four columns of the "Electrical Times," and tells the tale of a wide departure from the sweet simplicity of the gas-cooker. For the following details, we are indebted to our contemporary. There are two types of these cookers, known as "C" and "D." The "C" cooker measures 3 ft. high by 2 ft. 6 in. wide, and 1 ft. 11 in. deep, and is said to be of sufficient capacity to cook for a family of eight to twelve. It comprises oven, hot-cupboard, grill, and hob, with three boiling-discs. The oven measures internally 20 in. by 15 in. by 14 in., and is heated by elements placed on either side. There are four elements in the oven (said to cost 2s. 6d. each for renewals), two each side, placed one above the other, each being loaded to 500 watts at full heat. This allows for five changes in the heat control; the consumptions being 2000, 1250, 1000, 500, and 250 watts respectively. There is a baking tin or deflecting plate on the centre shelf. This fits between the two pairs of upper and lower heating units, and divides the oven into two equal portions. Thus either half can be used when a small quantity of cooking has to be carried out, or two classes of cooking can be carried on at the same time, and the two halves be run at different temperatures. Above the oven is the hob, which has a cast-iron top machined dead-flat and nickel-plated. In this are mounted loosely three boiling-discs, two 8 in. in diameter and one 6 in.; the ratings at the full heat being 1200 and 800 respectively, provision being made for three-heat control in all cases. On the underside of the hob is a grill measuring 11 in. by 8½ in., loaded to 1300 watts. This has exposed wire elements, protected by a stout metal grid. It is heavily insulated on its upper side so as to minimize heat losses through the hob. No heating unit is provided for the hot-cupboard, which is said to attain a sufficient temperature for plate and dish warming from the grill. The hot-cupboard has an available space of 20 in. by 18 in. by 4¾ in., and is situated below the hob. A cast-iron door, which drops down so as to form a shelf, is placed in front of the grill and hot-cupboard. With the full loading of 2 k.w., the oven reaches a temperature of *about* 440° Fahr. in *about* twenty minutes after switching-on. The model "D" cooker is intended for families of four to six; the oven measuring internally 15 in. by 13 in. by 12 in., with a loading of 1000 watts at full heat. There are only two elements in the oven; these being arranged for three-heat control. The grill measures 9 in. by 7 in., and is rated at 1200 watts. Two 6-inch boiling-discs are fitted on the hob, controlled by switches giving three heats, taking respectively 800, 400, and 200 watts. Between the oven and hob, and alongside the grill is a hot-cupboard with an available space measuring 18 in. by 15 in. by 4¾ in. Over all, the cooker measures 2 ft. 10 in. high, by 2 ft. wide, and 1 ft. 7 in. deep. It is mounted on short legs which allow of sufficient clearance to sweep and clean underneath. At full heat the cooker is loaded to 3800 watts. The list price complete of this small cooker is £12—a figure which our contemporary thinks "is by no means prohibitive for the average householder, and permits of hiring-out at reasonable rates." The gas industry knows better.

Electrical Comparisons.

Our electrical friends, when they make domestic cost comparisons, are in the habit of giving as little basic information as possible concerning the figures. It evidently does not suit their book to say too much, as, when details are given, it not infrequently throws open the door to damaging criticism. We see that the firm of Ferranti, Limited, have published a leaflet for distribution among the customers of electric supply undertakings; the intention being, of course, to extol Ferranti cooking and heating apparatus. A copy of the leaflet has not been forwarded to us, but, judging from the notice in one electrical paper, gas appears to have been let off lightly in the comparison between the merits of electricity and the demerits of its competitors for cooking, water-heating, and so forth. Most of the comparison is directed to coal, but the paragraph before us is devoid of all detail on which the figures are founded. One

of the most amusing things in the whole of the electric cooking campaign has been to see how willingly the courageous manufacturers of electric appliances have been prepared to take refuge in the ample skirts of old Mrs. Beeton, and to adopt her ancient dictum as to the shrinkage of meat cooked in coal or gas ovens being a percentage of something like 25 to 30, as though gas was not controllable and improvement had never been made in gas-cookers. We see that in this leaflet the losses in the weight of meat cooked by coal, gas, and electricity are shown graphically. Does the leaflet indicate the losses by gas when the meat is properly cooked, or when it is cooked at an excessive temperature? Or have Mrs. Beeton's hoary figures been once more resuscitated in order that Ferranti, Limited, may hide behind them, and if necessary later on excuse themselves? Figures, however, are given from "actual results" in a private residence of the use of electricity for cooking, room heating, and water-heating, as compared with coal, which at one time was used exclusively. It is stated that the cost of coal and wood during a year amounted to £12 14s., while the cost of current for cooking (1088 units at 1d.), for heating (278 units), and for a 400-watt electric water-heater, together with the outlay on coal and wood used in rooms not heated electrically, amounted to £11 18s.—a direct saving of 16s. To this must be added the saving in the butcher's bill of £2, making a total saving of £2 16s. in favour of electricity. With current at ½d. per unit, the gain by using electricity would have been over £5 in the year." What a frugal household this one appears to be in matters of cooking and heating! The figures fall far short of those obtaining in another household to the accounts of which for electricity there is friendly access. The Ferranti figures, however, suffer in that they do not, as presented above, give any scope for discussion, through the absence of details. Fancy the house of Ferranti trying to develop business by the use of such a statement, the value of which is about as manifest as bare figures can make it.

Danger in the Mine.

The electrical papers are ever trying hard to place gas in the dock as a culprit, and to prove on every conceivable occasion that electricity is a docile and an innocent fluid, totally incapable of doing harm. To say that it is is, of course, to maliciously malign it. The big disasters that have occurred, in which numerous lives have been sacrificed, and much property has been destroyed, due solely to electricity, have come, gone, and have ostensibly been dismissed from the memories of those who distribute electrical news—being followed by the same old pretence of an unsullied safety. There was the terrible death-yielding mine catastrophe in Wales of not so very long ago, when everything pointed unerringly to electrical ignition. Then the "Electrical Review," with intelligence superior to that of many of those who took part in the investigation, tried hard to show the fatuity of any such assumption or finding placing the responsibility on electricity. Now there is another instance—the Wharncliffe pit disaster on May 30, when twelve men lost their lives. Several witnesses at the inquest spoke of the possibility of an electric coal-cutter being the cause of the explosion. Both Mr. R. Nelson and Mr. H. A. Abbott, Inspectors of Mines, were distinctly of opinion that the gas was ignited by a spark from the cutter. That the motor had been sparking, one of them averred, could be seen from the condition of the commutator. Despite all external and interested opinions to the contrary, the Jury came to the conclusion that the twelve lives were sacrificed by an explosion caused by the stoppage and restarting of a fan with a defective coal-cutting machine running at the face, causing ignition.

THE "LANCET" HYGIENIC TEST FOR GAS-FIRES.

[From the "Lancet" for Sept. 12.]

We continue to see modern types of gas-fires, with a request to submit them to the hygienic test which was originated in the "Lancet" laboratory early in the year. It is evident to us that the manufacturers, generally speaking, are desirous of supplying to the public only those gas-fires which comply with this test. This is a very satisfactory state of affairs. We stated in an article in the "Lancet" for April 4* that we should be willing to undertake this test with any gas-fires upon the market which may have been overlooked among the number chosen for the purposes of our report in the article referred to.

Another Clean Sheet.

We have since published further results of testing [*vide* "Lancet," July 11†], and we now submit the results of an examination by the hygienic test of six gas-fires submitted to us by the Richmond Gas-Stove Company, Limited, of Academy Street, Warrington. The request was made to us early in May; and the fires were sent to us on the 15th of that month. But they were all 1913 models; and, in the light of the following results, it is clear that the standard of hygienic efficiency had been kept in view. One fire modelled by this Company—the Renaissance—happened to have been included in our independent report made in April; and this gave very satisfactory results when tested in our laboratory. The fires sent since—the "Period" series—bore the following names: (1) Louis, (2) Flambeau, (3) Georgian, (4) Tudor, (5) Bavarian, (6) Renaissance. The results are set out in the following diagram:—

The "Lancet" Test of Gas-Fires (*the Richmond Gas Stove Company.*)

Name of Fire	*Louis.*	*Flambeau.*	*Georgian.*
Without elbow	00000	00000	00000
2-feet length attached	00000	00000	00000
Name of Fire	***Tudor.***	***Bavarian.***	***Renaissance.***
Without elbow	00000	00000	00000
2-feet length attached	00000	00000	00000

It will be seen that these fires all through did not permit the slightest escape of combustion products into the room tested under the conditions described. The diagrams show that the canopy was examined at five different points, but in all cases the negative sign records a working hygienic efficiency. In the event of leakage, the sign + would appear. When testing the fire in the open room, without a flue attachment or connection with the fire-place chimney, the fire should be protected from external sources of disturbance; and this is easily done by guarding the fire during the test by a threefold screen. No such precaution should be necessary when the fire is in its practical position at the fire-place, on account of the increased pull given by the chimney. The test is a very delicate one, as indeed it should be, having regard to hygienic requirements. For ourselves, we are inclined to accept that when by the open test a gas-fire shows no leakage with (say) a 2-feet flue attachment—supplied by the makers of the fire—all that is required by hygienic considerations has been done. However, it is obvious to us that manufacturers are prepared to construct a gas-fire which shall pass the open test under the conditions described, and without the help of a length of flue attached to its exit channel (the nozzle). It may be a refinement to insist upon this; but one thing is perfectly clear, that a fire passing this test will, from the hygienic point of view, be free from reproach under practical working conditions. This standard is reached by the complete series of gas-fires submitted to us by Messrs. Richmond.

Pleasing Success.

It is gratifying to find that we have initiated an important movement in regard to rendering this method of domestic heating acceptable from the hygienic point of view. We may well leave economical considerations to the gas-fire industry; for clearly that industry is in good hands. The method will obviously not succeed unless heating results consistent with the cost of the gas consumed are furnished. As a matter of fact, this is accomplished by the modern models of gas-fires which we have examined; and the endeavour to gain the maximum heating efficiency without hygienic risk has met with a success which is pleasing to record.

Silencers for Gas-Fires.

Lastly, we hope that further attention will be given to the irritating noise made, more or less, by all atmospheric burners. This fact undoubtedly creates a prejudice against the gas-fire; and the greater the noise the greater is the impression that the gas bill is going to be big. In the sick-room, where the gas-fire is of the greatest convenience and service, it is particularly desirable that the sound of gas and air being intermingled and injected should not disturb the rest or equanimity of the patient. We are glad to find that practical attention is being given to this matter, with the view of removing the drawback; and among the "silencing" devices we have seen none that works more satisfactorily than the patent injector supplied with Messrs. Richmond's gas-fires. We need not enter into the construction of this; it is sufficient to say that we have had one of these silent fires under observation in a bedroom for several days, and the result is very satisfactory. Quite close up to the fire a purring sound was audible; but at a distance of a few feet it was difficult to hear anything at all, while at the bedside in the middle of the room—some 8 feet away from the fire—nothing could be heard at all. It seemed incredible that in spite of this gas was being consumed at the rate of about 30 cubic feet an hour in a cheery-red fire, giving a genial warmth and comfortable aspect to the room.

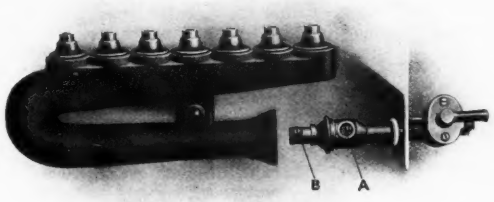
* See "Journal," April 14, p. 96. † *Ibid*, July 14, p. 93.

National Gas Congress and Exhibition.—In connection with the winding-up of the affairs of last year's International Gas Congress and Exhibition at Shepherd's Bush, mention ought to be made of the recognition of his valuable services in the capacity of Organizing Manager that has been received by Mr. Frederic W. Bridges. The exhibition was not only the largest that Mr. Bridges has ever been connected with, but it was also the most difficult from every point of view. That he carried everything through in a manner which afforded complete satisfaction, is evident from the fact that he has received some highly appreciatory letters, the writers of which were connected with the administration of the exhibition, and also from the resolution of thanks to him passed by the General Committee, in which acknowledgment was made of the whole-hearted, capable, and unselfish manner in which he had discharged his duties.

THE NEW "SOLA" GAS-FIRES.

"The Silent Heat of the Sun."

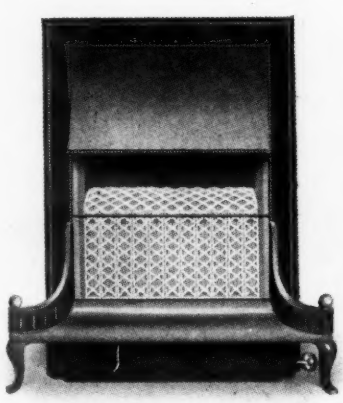
When Messrs. Wilsons and Mathiesons, Limited, introduced their "Sola" fire last year, every competent judge acclaimed it as a distinct advance in heating efficiency. Competence and honesty could not do otherwise. There was the fire; and sight and feeling, independent of all else, left no alternative but to admit that a stride on the road of gas-fire improvement had been made. So much so was this the case that one had no difficulty in picking out the fire at the National Gas Exhibition last October; even lay visitors were attracted by the concentrated intensity of the fire, and its general excellent appearance. The "Sola" fire has been for the coming season still further improved, and in a manner which makes the silent gas-fire a positive certainty, and not a fire that, while claiming to be silent, insists on its presence being known, not only through effective work as a heating agent, but through imposing an annoyance upon the ear. There is nothing more irritating to anyone engaged on mental work than to have the perpetual noise of a gas-fire invading the mind. There is no reason why this should be; and Messrs. Wilsons and Mathiesons prove it, for they, as a result of persistent investigation, have succeeded in producing improvements which have made the gas-fire as silent in its action as (may we dare to mention it in this connection?) an electric-radiator, which in all else is the antithesis of the "Sola" fire.



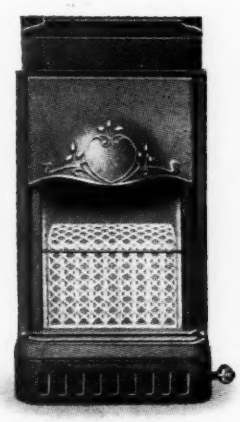
The New "Sola" Burner and Silencer.

In adjusting the burner, the milled head A of the pressure-regulator is turned until the flames are silent. The gas-nipple is then shut-down to the necessary point. Locking washers are provided to secure both devices in position.

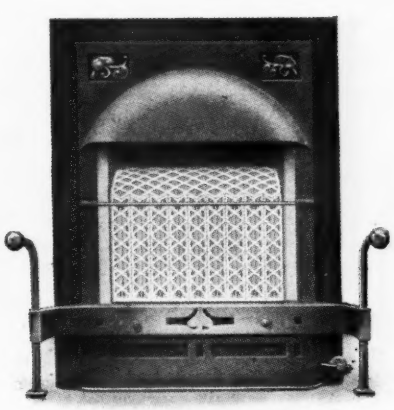
crease in the radiant energy sent forth in the form of heat waves. Thus a small high-temperature fire will yield as much radiant warmth as a larger low-temperature fire, and the need for the excessively wide gas-fire automatically disappears. Moreover there are many occasions on which a slightly more intense degree of radiation is very "grateful and comforting." Combine, therefore,



The "Adelphi" Fire.



The "Sola-Warwick" Fire.

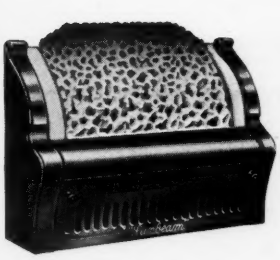


The "Astor" Fire.

We must go back a little way into the history of the "Sola" fire to fully appreciate the nature of the advance which has now been made. It may be remembered that the firm in constructing the "Sola" fire of last year maintained that the chief necessity in domestic gas heating is a hot fire, combined with wide range of adjustment to meet varying demands. To gain some idea of the reasons which influenced the firm in this decision, it would be necessary to enter into an argument too long for present discussion. Briefly, however, it must be remembered that an increase in the temperature of a gas-fire means an enormous relative increase in the radiant energy sent forth in the form of heat waves. Thus a small high-temperature fire will yield as much radiant warmth as a larger low-temperature fire, and the need for the excessively wide gas-fire automatically disappears. Moreover there are many occasions on which a slightly more intense degree of radiation is very "grateful and comforting." Combine, therefore, a hot gas fire with a wide range of control, and the greatest and most sudden fluctuations in external temperature can be at once, and effectively, counteracted. A really hot fire however necessitates hot flames. To obtain a hot flame, it must be well aërated; and well-aërated flames under the old (and still general) conditions are noisy. In last season's "Sola" gas-fires the flames were particularly well aërated, and yet were silent. This high flame temperature principle received complete support from the popularity which the "Sola" fire deservedly achieved.

At that time, however, to obtain the well-aërated, yet silent,

The "Sunbeam" Inset Fire in Grate.



The "Sunbeam" Inset Fire.

"Sola-Warwick" Fire in Mantel.

flames a gas-injector pressure of at least 2 inches was required. Where this pressure was not exceeded, the fire was substantially silent, but at higher pressures the injector developed a hissing noise, and the burner itself could not claim to be altogether inaudible. It became increasingly clear, therefore, that the first step towards the realization of a completely silent gas-fire must be the limitation of the gas pressure to some definite—preferably low—standard. At the same time the gas-injector nipples must be improved in construction. These considerations led Messrs. Wilsons and Mathiesons to the invention and perfecting of the combined nipple and regulator with which every "Sola" fire is supplied. By means of the regulator, the gas pressure immediately behind the nipple is reduced to approximately 1·25 inches water gauge, no matter what the pressure in the gas-supply pipe may be. This exceedingly low pressure was decided upon as a result of many experiments, because it was found that, with the improved form of injector nipple employed, any hissing noise was entirely prevented.

The injector nipple is itself of very novel construction. It consists of a smooth thin plate drilled with a large number of small holes. Regulation is achieved by the movement over the peripheral holes of a double disc, which is kept in close contact by means of a spring. Reduction of pressure, however, means that the injector force of the gas is greatly lessened; and it might well be argued it would not be possible to obtain well-aërated flames with an injector pressure as low as 1·25 inches water gauge.

However, all difficulties have been successfully surmounted, though the carrying out of the programme which Messrs. Wilsons and Mathiesons set themselves has necessitated an immense amount of work in burner design and construction. One point we may here mention, is that the "Sola" burners give perfectly even flames from end to end, and without the use of any internal checks or constrictions. We have seen the "Sola" gas-fires in operation, and can testify to their heating efficiency. At the same time, we realize how completely all noise has been subdued.

The tap with which every "Sola" fire is supplied gives a wide range of adjustment of the whole fire. This does away with the duplex tap to which many consumers object, on account of the incongruity of having the centre of a gas-fire incandescent while the outer fuel columns are altogether dead. Every "Sola" fire is in effect completely under control without the drawbacks of a duplex tap.

There are six patterns of the "Sola" fire for this season; and we can testify to their graceful design and beautiful finish. All "Sola" fires are hygienically perfect, as demonstrated by the stringent "Lancet" test.

THE "SUNBEAM" INSET FIRE—A REMARKABLE DEVELOPMENT.

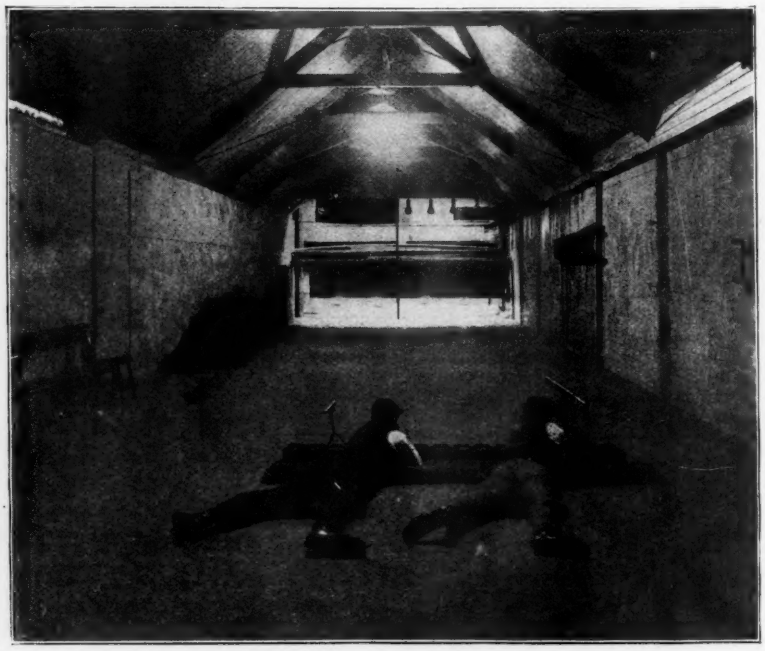
This fire is a new departure in gas-fire construction. It possesses the unique features of high-flame temperature and silence as described above, and yet has an appearance resembling a coal fire. Its radiant efficiency is high because the curved "fuels" do not baffle or stifle the flames. On the contrary, flame attraction and fuel construction are so nicely balanced that no flame is visible (outside the fire), yet the whole of the "fuel" becomes hot, giving the appearance of a deep glowing fire. The pieces of "fuel" are curved or banked, and have rough, open, front surfaces. These pieces when blacked give an appearance of a coal fire. "Sunbeam" fires can be fitted in a moment into the modern well or register grates. They should satisfy many to whom gas-fires have not previously appealed.

There is no question that Messrs. Wilsons and Mathiesons have again done much in the direction of popularizing gas as a means of domestic heating; and we can heartily congratulate them on their achievement.

THE LIGHTING OF A MINIATURE RIFLE-RANGE BY GAS.

THE September issue of the "Illuminating Engineer" gives some particulars on this subject, which we reproduce below, together with the illustration kindly placed at our disposal by the publishers.

The photograph—sent them by the Gas Light and Coke Company—is, they say, of special interest at the present moment. It shows the gas lighting in the miniature range of the Marylebone Rifle Club, where there are two rows of targets lighted by screened gas-lamps. The intention in this case is to produce a powerful but even illumination all over the targets; each one receiving the same amount of light. The targets should naturally be more brightly lighted than their surroundings. It is a well-known principle that the eye is most readily concentrated on the brightest object in the field of view; and it is equally important that the eye should not be fatigued or dazzled by any exposed lights. The metal shields—of which one has been removed, temporarily, in order to show the arrangement of the lights—screen the direct source of light entirely from the eyes of those firing. The targets thus "stand out" brightly illuminated amidst quite black surroundings.



LIGHTING OF THE MARYLEBONE MINIATURE RIFLE RANGE.

Another feature of interest is that the lamps are controlled from the end of the room where firing takes place. As a measure of safety, this is very desirable; since it removes any likelihood of a person being at the target-end in order to turn up the lights while firing is on. It also enables the range master to turn off the lights immediately each detail has fired, and to turn them up again when practice recommences—which, of course, makes for economy.

American Illuminating Engineering Society.

The eighth annual convention of this Society will take place at the Hollenden, Cleveland, Ohio, from the 21st to the 25th inst. There is a long list of papers and addresses; and in the preparation of the programme the social side has been well cared for. The titles of the communications to be presented at the business sessions indicate the varied nature of the subjects which the members will be asked to consider. They are: "Factory Lighting."—"Some Experiments with the Ferree Test for Eye Fatigue."—"Planning for Daylight and Sunlight in Buildings."—"Notes on the Ulbricht Integrating Sphere and Arc Lamp Photometry."—"Effect of Room Dimensions on Efficiency of Lighting Systems."—"Relation of Light to the Critical Inspection of Documents."—"Experiments with Coloured Absorbing Solutions for Use in Heterochromatic Photometry."—"A New Standard Light Source."—"Artificial Daylight: Its Production and Use."—"Characteristics of Gas-Filled Lamps."—"A Transmission and Absorbing Photometer for Small Areas."—"Recent Improvements in Gas-Lamps."—"Illumination of Light Shafts."—"Portable Mine Lamp."—"Some Recent Experiments on Vision in Animals."—"Light Filters for Use in Photometry."—"The Locomotive Headlight."—"Present Practice in Machine-Shop Lighting."—"The Development of Daylight."—"Lighting of the Home."—"Lighting of a Carpet Mill."—"Colour Variation in Illuminants."—"Reflection Standards."—"Physiological Effects of Light on the Body."

Water-Works Engineering.—We have just received from Mr. Fred. C. Uren, who is the Surveyor to the Aldershot Urban District Council, a volume (of which he is the author) bearing the above title. It is a practical treatise on the construction of water-works, for the use of engineers and students of engineering. There are 228 pages of text, 186 illustrations, and numerous plates, together with reports, specifications, and tables of water charges. The book, of which a fuller notice is reserved for a subsequent issue, is published by Castle Litho Limited, Bristol.

WILSON'S "CONTINUOUS-INTERMITTENT" VERTICALS.

A YEAR'S EXPERIENCE AT JOHNSTONE, N.B.

By James Dickson, of Johnstone.

[A Paper read before the North British Gas Managers' Association, Sept. 3.]

In beginning such a paper as this, dealing with the most fascinating of present-day processes in gas manufacture, one realizes at once what a wide field of research and investigation stretches before him. The carbonization of coal has always been with the gas manufacturer a problem of surpassing interest; and the writer considers that more than ever, as time goes on, the total gaseous and liquid products that are hidden away in the coal measures of this country will require to be more zealously sought after, and their value realized in the very best markets. The means available for doing this have been constantly improving; and in no branch of the gas industry has more activity been shown than in the destructive distillation of coal, in order that it may give up in their most marketable forms its gas, coke, tar (with its numerous distillates), and ammoniacal liquor—either in the form of ammonia itself or as sulphate.

It is unnecessary for me in the scope of this paper to go into the evolution of carbonization from the day of the direct firing of retort-settings through the times of gaseous firing and the introduction of machinery to charge and draw the horizontal retorts up to the time of the inclined, and now the vertical, retort. The story is well known to all of you; and the best interests of this meeting will be served if I confine myself entirely to the results of our own system of retorting, which has been patented by one of your members, Mr. Alexander Wilson, the Chief Engineer of the Gas Department of the City of Glasgow, and has become known as the "continuous-intermittent" process—*i.e.*, continuous gas-making and intermittent withdrawal of coke and charging with coal.

Description of the Plant.

The installation erected at Johnstone consists of one bench of eighteen retorts, made up of three settings of four and one of six retorts. The retorts are 23 ft. long, 3 ft. 4 in. by 10 in. at the top, tapering a distance of 11 ft. 6 in. to a length of 4 feet, and a width of 1 ft. 6 in. This dimension is maintained to the bottom. They are built of brick, and are capable of carbonizing 3 tons of coal per twenty-four hours. Each setting has a producer, 12 feet deep, supplied with two cleaning doors; and one-half of the producer is cleaned each twenty-four hours. The producer, on being filled-up after cleaning, does not require more fuel until the other half of the fire is cleaned twenty-four hours later.

The coal is emptied from railway waggons, by means of a hydraulic tip, into a receiving hopper of 10 tons capacity. It passes through an electrically-driven coal-breaker furnished with a bye-pass shoot for the smaller coal. An electrically-driven endless chain gravity bucket elevator, provided with the necessary tipping gear, delivers the coal to bunkers of sufficient capacity to last for 48 hours. This same plant is used for elevating the coke for the producers; and suitable coke shoots are provided with shutter doors (operated by lever) fixed to the bottom of the coke hopper for filling the producers by means of a suspended shoot running on rails.

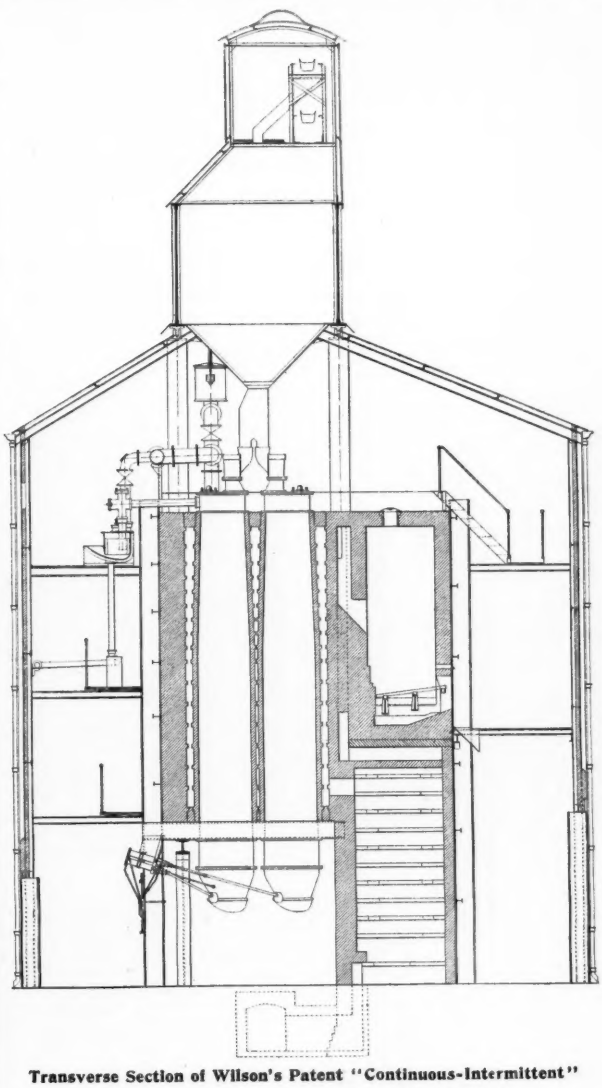
The tops of the retorts are provided with cast-iron mouthpieces and gas-tight coal-feeding valves of the plug type, having the openings at right angles and fed from breech-pieces fixed to the bottom of the coal bunkers. The bottoms of the retorts are provided with cast-iron coke hoppers and water-sealed buckets operated by small hydraulic rams. The coke-hoppers are each furnished with a pressure-gauge in order to give the stoker indication of pressure in the retort, and a steam connection for use during drawing times, or for gentle steaming purposes generally. The gas is taken off the mouthpieces by 6-inch pipes to the hydraulic main, which is divided into four sections, one for each setting, and divided longitudinally by a curtain dipping into the liquor, and doors provided on the outer portion for cleaning purposes. Suitable tar and seal-regulating valves are fixed thereon; and the tar-pipes are sealed in four pots.

The dip-pipes to the hydraulic are furnished with bye-pass valves which are used during the process of charging in order to give relief to the momentary pressure that is set up in the retort at this time. A 12-inch Peebles retort-house governor is fitted on the overhead foul-gas main.

The position of the producers is on a floor-level, 18 ft. from the ground. The gas travels upwards by means of a port, 2 ft. 4 in. wide, placed half-way between the fire-bars and the top. It is divided into two streams entering the setting, one on each side between the outside wall of the retort and the division wall. Here it meets the secondary air, travels along the outsides of the retorts, and, turning in front, is further mixed in its travel between the retorts to the back, where it passes by means of a port to the chamber beneath. A reverse travel here takes place, with further and more intimate mixing. The gases in this zig-zag manner traverse the depth of the retort to the regenerator, which they enter by four ports, two on each side. The secondary air is admitted on the ground-level by means of two inlets, and travels upwards between the two down-coming waste-gas flues. In this way it is raised to a high temperature before reaching the combustion chamber. The primary air is also admitted on the ground level, and travels through the regenerator before passing beneath the fire-bars. The waste gases leave the regenerator at a very dull red temperature, scarcely visible.

Starting-up and Some Earlier Difficulties.

Two ovens of four retorts were started on July 22, 1913, after the brickwork had been dried for a period of two months by means of slow fires. From the outset, difficulty was experienced with the draught, which was obtained from the chimney of the horizontal bench now let-down. This chimney, 85 feet high and 4 feet wide, was removed a distance of 25 yards from the end of the vertical bench and connected therewith by means of an underground flue. The heating of the retorts was satisfactory until the horizontal bench was let-down entirely; but after this had been done the cooler chimney refused to give the required vacuum, with the result that sufficient producer gas could not be obtained. Although blowers were put into the bottom of the producer and gas made in this way for a time, it was obviously not a real and



Transverse Section of Wilson's Patent "Continuous-Intermittent" Vertical Retorts at the Johnstone (N.B.) Gas-Works.

permanent remedy, as the insufficient draught would not on occasions carry it away, and no certainty of working could be procured when it came to regulating the amount of secondary air. It was evident, after repeated trials and alterations, that until a lasting remedy was found it would be necessary to keep one oven of the horizontal bench under slow fire, for the purpose of aiding the temperature at the bottom of the chimney.

The exigencies of reconstructing the works and still keeping everything going as evenly as possible would not permit of laying-down a new chimney at the end of the bench; and it was found that the existing chimney would not safely carry an additional 30 feet of height. Finally we decided to lay down a Keith-Blackman fan, capable of dealing with 29,000 cubic feet of gases per minute at a temperature of 600° Fahr., and giving a water gauge of 1 inch. As the maximum amount of gases at present coming over does not exceed 6000 cubic feet per minute, the fan only requires to run at a comparatively slow rate. The engine is a Reader vertical enclosed type, fitted with splash and force-feed lubrication and a Pickering governor.

This was admittedly at the time only a temporary expedient

against the day when the bench will require extension with one central chimney to serve both sides. But the fan has shown itself to be a positive machine capable of accurate adjustment of draught, with extremely low running costs. The energy absorbed is from 2 to 2½ H.P.; and it keeps the heat perfectly under control in all sorts of weather. The cost of the complete job was £138 18s.

On account of very limited storage (last winter the delivery per day was 486,000 cubic feet, and the storage capacity a little under 300,000 cubic feet) a good deal of delay occurred in the fixing of the fan; and it was necessary to do parts of the brickwork seating and inlet and outlet connections on successive Sundays. In this way the month of December was reached before satisfactory working results could be hoped for; but from the day that sufficient draught was obtained, the throughput of the retorts increased, and the fuel consumption benefited largely, as the oven on the horizontal bench was immediately shut-down.

It will be readily understood by those who have come through the inaugural difficulties that require to be overcome in any new system (and especially such a radical change as from horizontals to verticals entire) that enough claimed attention without the added worry of being constantly apprehensive as to the state of the draughts; and my ideas of vertical retorting during this time were somewhat complex.

However, the labour costs through it all showed a steady decrease; and in the month of December alone the cost of handling and carbonizing the coal and dealing with the coke amounted to £119 6s. 8d. less than in the corresponding period of the previous year for an increased make of 1,078,200 cubic feet, and totalling on an aggregate of 12,357,800 cubic feet—a saving of 2·32d. per 1000 cubic feet made.

It was then somewhat late to entirely overcome earlier shortcomings; and the remainder of the year was got through quietly, but always with the aim in front to improve upon our time of hard experience.

One very troublesome matter with which we had not been previously brought into contact in horizontal retorting was the accumulation of pitch in the hydraulic main and off-take pipes. Some of this was very hard, and at the start required fishing-out once every three or four days if it was hoped to avoid back-pressure through the bottoms of the dip-pipes becoming surrounded. The first decided appearance of this was at a time when our circumstances made it necessary to go on a longer period of charge, and hang some of the retorts, whereby the gas was over-cracked and pitched the off-take pipes, hydraulic main, and even as far as a distance of 40 feet along the tar-main.

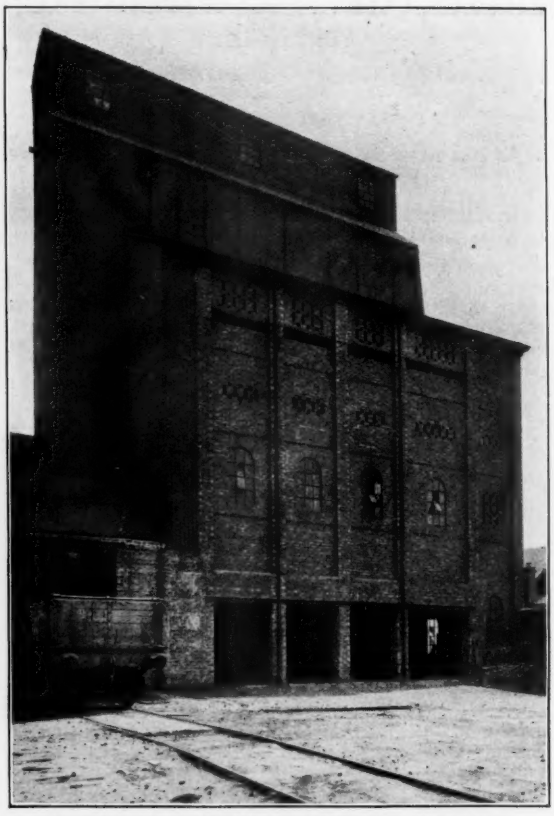
The following is an analysis of the tar on this occasion:—

Liquor		·8 p.c.	By weight distillate	S.G.	1·00
Light oils . .	170°C.	5·5 ,,	,,	,,	·81
Carbolic oils .	230°C.	1·7 ,,	,,	,,	1·13
Creosote oils .	270°C.	2·7 ,,	,,	,,	1·00
Anthracene oils	320°C.	16·0 ,,	,,	,,	1·04
Pitch		66·8 ,,			
Loss		6·5 ,,			

The specific gravity of the tar was 1·206; and it was solid at ordinary temperature.

The remedy lay in arranging as far as possible to avoid having any retorts hanging an undue amount of time.

It was also discovered about this time that the off-take pipes augered-out best after a fresh charge of coal was put in and the first flow of gas was coming off the retort; and after some readjustment had been made in the size of the auger (which previously was too neat a fit for the off-take pipe), the cleaning of the pipes became a very easy matter. They are now run-through once in twenty-four hours.

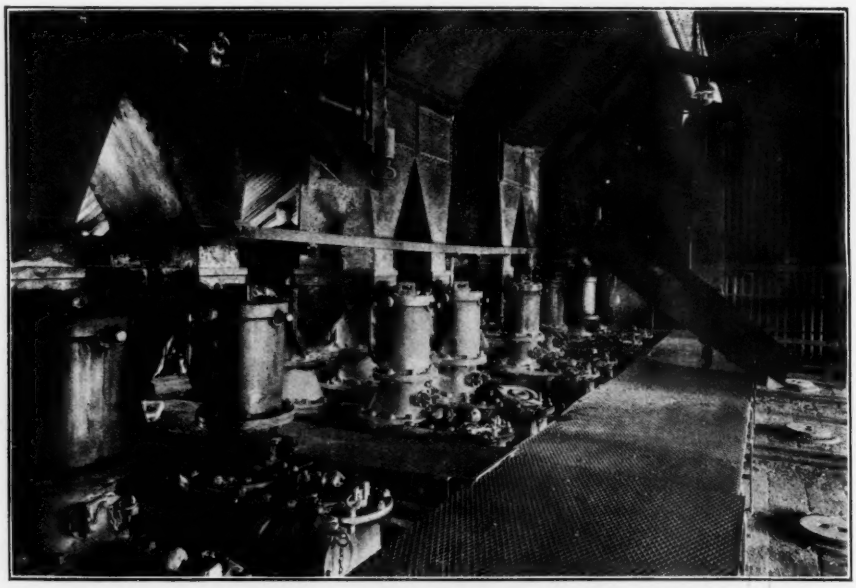


Front View of the Vertical-Retort Structure at Johnstone.

The pitchy matter that gathers in the main has to be removed once in ten days during the summer and once a week during the winter. Most of this is caused by fine coal getting over into the main during the process of charging. It will be readily understood that in our retort, with a space left at the top every four hours for the reception of 10 cwt. of coal, the drop of 7 feet which it gets in the first instance is bound to send the coal dust over into the main. Its removal by means of the doors on the main opposite each dip-pipe is readily accomplished.

Observations upon the General Working.

With regard to the retort and its means of charging and discharging, the beauty and simplicity of the arrangements appeal to one as being scientifically perfect. In practice, they have been found to answer admirably to the different coking qualities of the many kinds of coal—from cannel to dross—that have been passed through them. Little difficulty has been experienced with charges hanging-up if the retorts have been kept free from an excessive



VIEW OF THE TOP MOUTHPIECES OF THE RETORTS, WITH THE CHARGING VALVE AND THE OUTLETS OF THE COAL AND COKE HOPPERS.

accumulation of carbon. At the first indication of sticking-up, although the retort on which this is taking place is not due to be scurfed, it is let-down and cleaned. The charge is taken out in the usual way every four hours, and the retort gradually emptied. This occupies about twenty-four hours. The seal is temporarily raised to make up for excessive evaporation about this time; and the diminution of gas output is watched by means of the safety-ball on the mouthpiece. At the end of twelve hours all the gas will have been given off; but some time previous to this the ball is turned and the thin gas allowed to escape.

The blank flange on the crosspiece of the off-take pipe connecting this with the dip-pipe is then removed; the dip-pipe is closed and made perfectly tight; the bottom of the retort is slightly opened; and the air is allowed to enter and burn-off the carbon, at the same time burning-out the off-take pipe. At the end of twenty-four hours any carbon that is left can be easily removed by light bars with the face turned up U-shape, and any necessary patching carried out.

The retort is then filled up with coke to within 7 feet of the top, and charged and set to work some time thereafter. This process takes 54 to 56 hours from beginning to end. It can be best carried out at the week-ends if circumstances allow of two retorts being let-down at one time. The retorts run from six to seven weeks between scurfing times.

The retort was designed primarily to suit the class of coal generally met with in Scotland, which is of a non-coking nature; and it was considered that a period of rest of at least four hours, with the pressure to which the mass was subjected during that time, would give the desired improvement in the quality of coke, and at the same time give a fairly high candle power gas.

It differs from the purely intermittent type in that, when the work to perform in carbonizing. Evidence of this is seen when the retorts are open for scurfing. Few traces of carbon are found below the part mentioned. The fact that the coal is plunged into the hottest part of the retort, and has most of its gas driven off here, preventing the degradation of valuable hydrocarbons by contact with red-hot coke, adds considerably to the value of the resultant products—especially the calorific value of the gas.

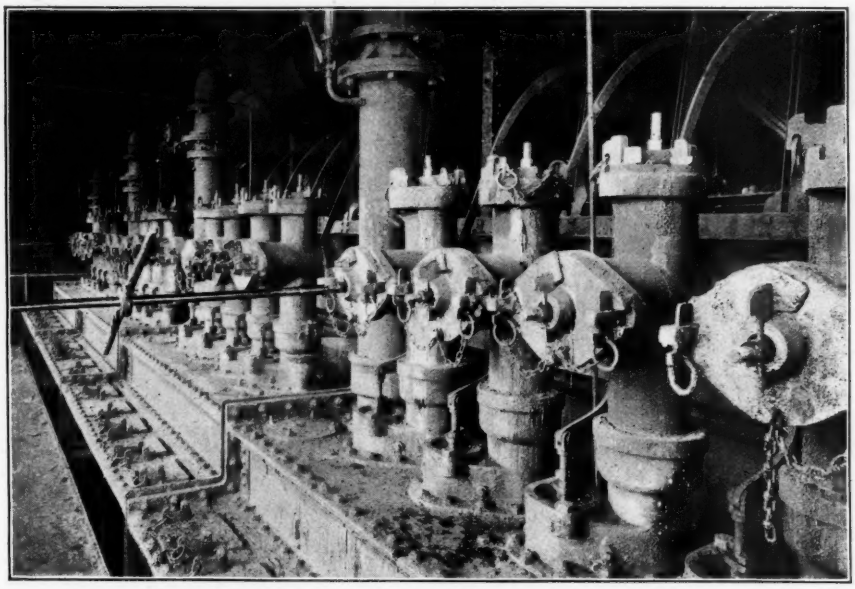
The working of the elevating plant has given no trouble, after a skin had once formed on the wearing parts and bearings. But previous to this it required a good deal of watching. The coal-valves are perfectly satisfactory; and the hydraulic arrangements for the removal of the dish-shaped bottom of the retort have required exceedingly little attention.

Regarding the draught on the bench, the fan is set to give 65-100ths to 70-100ths, or (say) 55-100ths to 60-100ths vacuum on the main flue at the end of the bench, where a King's gauge is fixed. The gauge in the top combustion chamber is level, to 3-100ths of an inch pull. Pressure here lowers the heats, and excessive draught is wasteful and dangerous.

The secondary airs after adjustment are kept constant, and the primary airs altered as required to give a slight appearance of fuel gases at the bottom of the retort or else just before entering the regenerator.

The producer pans are kept filled up with water, and steam is always passing in. Once a week the fires are burned down; the producers examined from the top; and the clinker adhering to the sides pinched away.

The fact that the coal hoppers are sufficient to last out nearly two days, enables us to leave them full on Saturday at mid-day, and they are in a safe condition on Monday morning, though a start is always made to elevate right off.



VIEW OF THE HYDRAULIC MAINS AND CONNECTIONS.

charge is put in, it drops only a distance of from 6 to 7 feet, and there is not the same tendency for it to pack in the centre and be loosest round the sides. Besides only 7 cwt. of cool coke requires to be dealt with each time a retort is drawn. In the continuous type, with the coal creeping down the retort, the same consistency of the mass can hardly be expected with what might be called in Scotland secondary coking coals. The retort has amply fulfilled both requirements, and is capable of also dealing satisfactorily with the most highly coking coals we have. About 10 per cent. of our total tonnage consists of coal of the Auchengeich or similar class, put through for the purpose of making a good smithy coke for local industrial use. This coal is the nearest approach to an English coal; and if it does occasionally give an indication of sticking-up on the top, the shutting of the coal valve before the retort is quite full—thereby leaving a space of 6 inches of the retort and the mouthpiece unfilled—quickly remedies matters. It is in this way subjected to a higher temperature, and is therefore not in so pasty a condition as it would have been in the colder mouthpiece. In four hours' time it is in a much more advanced state of carbonization, and consequently in a better condition for dropping to make room for the next charge.

Almost exactly the same condition of carbonization is apparent in a badly-charged horizontal retort, where it has been too heavily loaded near the mouthpiece, as exists in the vertical retort hereabouts; and the more highly caking the coal and the lower the temperature of carbonization the greater will be the trouble with charges sticking. With the Wilson retort, the heating gases are burning downwards, giving the highest temperature at the top and second chambers, and most of the carbonizing is done here and in the third chamber, at an approximate distance of 12 feet from the top. The rest of the parallel portion has comparatively little

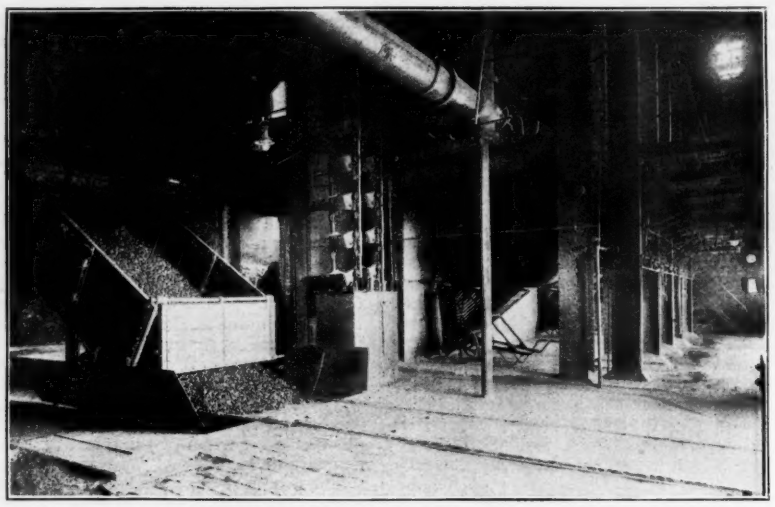
To facilitate the changing of the shift, charging is suspended from 6 A.M. to 2 P.M. on Sunday, and the man in charge gives attention to the nature of pressure or exhaust inside the retorts, and regulates the pull accordingly.

Generally, the claim of the patentee, that endeavour has been made to keep the process simple and avoid all continuous working gear in connection with the retorts, is borne out in practice.

Adaptability.

There can at least be no question regarding the adaptability and facile working of vertical retorts for large gas-works. The number of new installations for which orders are being almost daily obtained is surely sufficient evidence of this. Regarding the smaller works the writer is fairly safe in saying that the first matters for careful consideration to one who is thinking of installing vertical retorts in (say) a 50-million works where the present carbonizing plant is inadequate, are the size of plant to meet present nad further demands, how the number of retorts can best be arranged to suit his varying outputs, and the size of each retort, having regard to the fact that scurfing must be undertaken once in six weeks. If a decision be made for verticals, would it not be worth while considering the addition of a coke-handling plant? Coal-handling plant with vertical retorts is a necessity. Why should the residual coke be handled and stacked by barrow at a cost of from 6d. to 8d. per ton if it can be conveniently tipped into an elevator boot or elevated by hoist and stored in an overhead hopper, from which supplies can be drawn to waggon or cart?

One cannot help remarking that for works round about this size improvements are yet sure to be effected which will bring down the amount of coal dealt with per retort. Here a unit dealing with



VIEW UNDER THE RETORTS; ALSO SHOWING THE GRAVITY-BUCKET CONVEYOR AND THE COAL-WAGGON BEING TIPPED OVER THE COAL BREAKER.

30 cwt. of coal per twenty-four hours would be a big advance upon present conditions, and yet be more elastic on a maximum daily output of (say) 200,000 to 250,000 cubic feet, than a 3-ton retort which, in lying off for two days for scurfing purposes, would reduce the make of gas by at least 30,000 cubic feet per day—equivalent to from 12 to 15 per cent. It has also to be borne in mind that ten days at least are required in heating-up an oven of six; a week, an oven of four; and to do justice to a unit of two, the same time would be required.

One must look further ahead in providing for the shortening day; and the smaller the required unit that can be started at intervals from August to January, and then let-down after this, the better will the general results be.

These remarks are put forward so that the points raised may receive due consideration from prospective vertical-retort users.

Working Results.

The cost of the installation was £10,153. This sum included the bench, coal-handling plant, and the necessary hydraulic plant for operating the bottom doors and also for assisting in shunting operations by means of a capstan. There is no coke-handling scheme; and the coke meantime is dealt with by barrow. This adds considerably to the working costs, more especially during the maximum demand period; and it will be necessary in the near future to provide for more economical handling of the coke. The interest and sinking-fund charges amount to, approximately, £710. The saving in labour is an outstanding item that contributes to the repayment of this. Taking into account the uneven working for four months, the lessened charge of £617 10s. 9d. under this head on an increased make of gas of 9,703,000 cubic feet, and equal to 1·47d. per 1000 cubic feet on the total gas made for the year, must be considered satisfactory. The yield of gas per ton was 10,113 cubic feet, against 9820 cubic feet the previous year; but the small increased yield was due to a cheaper class of coal being used. The following is a comparative statement of the percentages of the different sorts used during the two years.

	Year 1913-14 (Horizontals).	Year 1914-15 (Ten Months, Verticals).	
Second-class cannel	11·9 per cent.	6·3 per cent.	
Splint	52·6 ,,	61·5 ,,	
First-class coking coal	15·6 ,,	6·6 ,,	
Second	18·5 ,,	16·7 ,,	
Nuts	1·4 ,,	8·9 ,,	Treble and double nuts and dross.

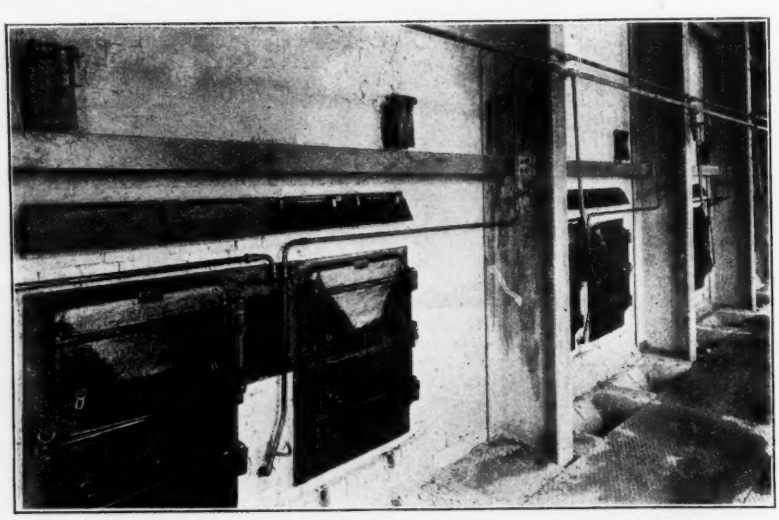
The tar yield increased from 12·90 to 14·63 gallons, and the sulphate of ammonia from 26·50 to 28·99 lbs.; while coke fell from 9·90 to 8·78 cwt. per ton of coal carbonized The drop in coke is a very considerable offset on the debit side; and even taking into account our starting difficulties, I have no great hopes of a yield per ton with verticals approaching that of horizontals. Although the effect may be temporarily noticeable in a reduced revenue, the other and better aspect is that the dry nature of the coke sold enables a good market to be found, and the price received over a year (a bad one for coke) averages 12s. 2d. per ton—including, of course, that sent out of town.

Taken in their entirety for ten months' working, the saving on labour and general carbonizing results amounts to £819 10s. 10d., equal to 1·94d. per 1000 cubic feet made, as compared with the results previously obtained from horizontals. The comparison somewhat favours the latter, as the present coke prices would not have been obtained.

The remaining two months of the full year come under the year 1914-15, and show a make per ton of 10,808 cubic feet, a fuel consumption of 16·42 lbs. of coke per 100 lbs. of coal, a tar yield of 15·69 gallons, and a liquor yield of 55·5 gallons, or 8·5 oz. sulphate of ammonia per gallon, equal to 29·48 lbs.

These results have been obtained from the following percentages of the different sorts of coal:—

Splint	44·9
First-class coking	9·0
Second ,,	17·8
Treble nuts to dross	28·3



VIEW SHOWING THE DOORS OF THE PRODUCERS AND THE BOXES FOR INSERTING THE TEMPORARY FURNACE-BARS.

It will be noted that the percentage of lower grade coal is being increased, while the general results show improvement.

The average calorific value is 647 B.Th.U. gross and 583 B.Th.U. net; and the illuminating power is 17 candles.

When on 4 hrs. 48 min. duration period of charge throughout a portion of the summer, the make per ton increased by between 400 and 500 cubic feet, and the calorific value dropped to 593 B.Th.U. gross and 534 B.Th.U. net, the candle power to an average of 15·6, and the fuel consumption rose to 18 lbs. of coke per 100 lbs. of coal carbonized.

Comparative volumetric analyses of the gas taken over these periods are annexed—

	4 Hrs. 48 Min.		Four Hours.
Carbon dioxide	3·05	..	3·10
Illuminants	3·30	..	5·00
Oxygen	0·45	..	0·50
Carbon monoxide	9·90	..	7·50
Methane	28·35	..	33·90
Hydrogen	49·80	..	43·25
Nitrogen	5·15	..	6·75
	100·00	..	100·00

The percentage of illuminants and of methane on four-hour charging is worthy of notice.

An analysis of an average sample of tar showed the following results:—

	Per Cent. by Volume.		Per Cent. by Weight.		Specific Gravity.
Liquor	10·0	..	9·7	..	1·037
Light oils	8·0	..	6·8	..	·906
Carbolic oils	10·0	..	9·0	..	·962
Creosote oils	14·7	..	13·8	..	1·000
Anthracene oils	18·5	..	17·9	..	1·033
Pitch	—	..	39·5	..	—
Loss	—	..	3·3	..	—

Specific gravity of tar . . . . . 1·068
Twisting point of pitch . . . . . 113° Fahr.

The maximum amount of gas made per retort per twenty-four hours has been 33,000 cubic feet.

Complaints due to naphthalene stoppages last year for the months of May, June, and July totalled 195. For the same period this year the number is 23. The intrinsic value of this is considerable. It has contributed largely to my now being able to effect a reduction in the outside staff, which will mean a further saving of £100 per annum. There is every indication of the installation showing a 10 per cent. return on a full year's working; and a scheme for handling coke will increase this figure.

Let me add in conclusion that when the present complete scheme of reconstruction of the works is finished, the cost will have more than doubled the capital debt of the undertaking. The extension has, unfortunately, been carried through at a time when the price of material and labour has ruled high; and another factor that did not assist manufacturing cost was the rising price of coal. Yet, in spite of this, one more tribute has to be paid to the virility of the gas industry, in that the Corporation of Johnstone have been enabled to supply the ratepayers with gas at 1s. 10d. per 1000 cubic feet, and are now looking forward to a period of increased business, which they are in a much better position to meet.

DISCUSSION.

The PRESIDENT (Mr. D. Vass, of Perth) said he was sure they had all been delighted with the frankness with which Mr. Dickson had put before them his difficulties in connection with the introduction of this new retort installation at Johnstone. These difficulties, as the paper very well pointed out, were not at all due to the principle involved, but to local circumstances. It was well for those who had practical knowledge to learn of these difficulties; so that if they came to be similarly placed, they would be in a position beforehand to realize what might be expected. They could not always get their retort-bench up against the chimney, and there was always the difficulty if there was a large stretch of flue, and if the flues happened to be in a damp underground. He invited discussion on this interesting and practical paper; and he hoped it would be carried on with vigour.

Mr. A. C. YOUNG (Arbroath) said that at his works they had had the Wilson system working for five or six weeks,* and he had experienced some little difficulty with the draught. On this point he thought it would be interesting to know what draught Mr. Dickson had after he let-down his horizontal furnaces. Mr. Dickson said he worked with a draught in the main flue, after having put in a fan, of 55-100ths to 60-100ths of an inch. At Arbroath, when the horizontals were in use a draught of 110-100ths of an inch water column was obtainable; but the regeneration was so perfect with the new verticals that the heat available in the main flue for draught purposes was very low, and, with a chimney stalk 140 feet in height, only 60-100ths was now being obtained. Frankly, they would prefer to have more. It was quite understandable that troubles would arise in Johnstone owing to the retorts hanging-up for several days each week on account of shortage of storage; but his (Mr. Young's) experience had led him to be assured that they would have great scope in reducing or increasing the quantity of gas as circumstances required. With the settings erected at Arbroath, they had great control over the temperatures, and the make of gas could be anything desired from 25,000 to 35,000 cubic feet per retort. He was a little surprised that Mr. Dickson had only just discovered a method of arriving at the point to which the coal had to be filled in the retort. The rod which was used for this purpose was a very simple thing, and was, he (Mr. Young) understood, the subject of a patent. He could not conceive how Mr. Dickson was able to work so long without this rod. Altogether their experience at Arbroath already went to show that the percentage of coke used was likely to be very much less than with the horizontals. The coke, however, was now filled so very dry that it was just possible they might not sell more coke per ton, as compared with what they did formerly. Then the saving in labour at Arbroath showed that their working costs could come down from 2s. 6d. per ton, which they formerly were, to about 10d. per ton during the summer months, and even less in winter. The results led him to feel that they might be assured throughout the year of an increased yield of 1000 cubic feet of gas per ton of coal carbonized, without reducing the illuminating power; and that, too, from the same class of coal as they previously used. They were obtaining 11,800 cubic feet per ton of 16-candle gas, against 10,200 cubic feet of 17½ candles formerly; and this from ordinary semi-coking nuts—single and double. Of course, it was an easy matter to increase their yield by (say) 2000 cubic feet per ton over what they formerly took out of the coal; but it would be at the expense of the illuminating power. It was a question for consideration whether it would not pay them better to go in for the increased make of 2000 cubic feet per ton, and enrich the gas slightly by means of a carburettor. During the month of July very serious trouble took place through naphthalene deposits in the service pipes; but these gradually disappeared during the first three weeks of the vertical gas, and not one complaint about naphthalene had been received during the past fortnight. Considerable trouble and annoyance had been caused to consumers for some time past on account of their fittings having been choked with naphthalene; but he (Mr. Young) looked forward to being free from the necessity of sending out fitters to assist the consumers in clearing-off deposits. If only for this relief he was satisfied that the verticals might be worth the money spent on their introduction.

Mr. D. ROBERTSON (Dunoon) observed that he had listened with great pleasure to Mr. Dickson's excellent paper. Mr. Dickson had tackled difficulties which were incident to all new installations, with the greatest determination and vigour, and also he (Mr. Robertson) thought with success. In starting such a plant as had been inaugurated at Johnstone, there were difficulties to be encountered and overcome, even with other well-designed and well-constructed installations. Some plants seemed to have greater difficulties than others; and Mr. Dickson's installation appeared to be somewhat unfortunate from the fact that the chimney was so far removed from the retort-bench that the draught was insufficient to obtain the required heat in the setting. Mr. Dickson had overcome this trouble, and apparently things were going on very successfully at present. He (the speaker) had not had any experience of the particular system Mr. Dickson had adopted, as the system which he personally had the pleasure of starting was the continuous one. After all, there was not so very much difference in the systems except in the feeding-in of the coal and the extraction of the coke; and from his experience of the continuous system he might say that if something of the same kind had to be contemplated again by him, he would simply do as he had already done. With the one system they introduced the exact quantity of coal they wished, and they extracted the quantity of coke necessary; while with the other system they could not possibly regulate the extraction of coke so finely. This, and some other little disadvantages like it, were overcome in the continuous system. He was not speaking at all dogmatically when he made this statement; and he hoped he was not inferring by his remarks that the continuous system was bound to be superior; he was only stating what he believed to be the case. It was his opinion, and he felt he was entitled to express it. The system of vertical retorts was, in his view, much superior to that of horizontals. For one thing, with vertical retorts they were not at the mercy of incompetent or careless stokers. The stoker was bound to put in the coal and take out the coke; he really could not help himself. He (Mr. Robertson) noticed that Mr. Dickson had been troubled with tar-pitch. Frankly, he was glad to say he had no personal experience of this substance, and the retorts at his works had been in operation for eight weeks. On the 10th of July they shut-down their horizontal retorts, and they had not been lighted since. From that date, moreover, they had never seen thick tar. He had looked for it, but up to the present he had not been able to find tar of any thicker consistency than ordinary sweet milk. He was really astonished at this, because it was one of the dreads he had when he introduced the system. There was one other point he would like to touch on, and it was that anyone introducing vertical retorts ought to see that there was a sufficiency of gasholder accommodation. The units were so great—something like 35,000 cubic feet of gas per retort—that if they had retorts in units of two they were losing or gaining 70,000 cubic feet of gas every 24 hours when lighting-up or shutting-down. In the vertical-retort system there were certainly a great many points to be dealt with and considered, which they could only clearly understand when they came to actual working with the plant. So far as he had gone, experience had taught him to be particular in his selection of coal. If they used what were called "fat" coals in the verticals, they would be almost certain to have hanging-up. Fat coals could only be worked satisfactorily when they were mixed with coals of a lighter quality. Mr. Dickson was certainly very favourably

* *See* "JOURNAL" for Sept. 1, p. 513.

situated in having a 48-hours' supply of coal in his hoppers. At Dunoon he had only a 24-hours' supply; and he found now that he would have been better with the larger supply. He might add that they could get 35,000 cubic feet of gas per retort, with coal of fair quality; if they were pushed, they would be able to make even a larger quantity. In conclusion, he desired to take the opportunity of congratulating Mr. Dickson on the excellence of his paper and the full information he had given to the meeting.

Mr. ALEXANDER MASTERTON (Edinburgh) thought it would be instructive if Mr. Dickson could give them the prices he paid for the various classes of cannel and coking coal which he employed to produce the yield of gas per ton mentioned in his paper. In this way they would be able to make comparisons between these coals and those they themselves were at present using—not only for yield per ton, but for illuminating power and calorific value. He would also like to inquire what the total labour costs amounted to per 1000 cubic feet of gas made with the old system and what they were now with the verticals. From the remarks he observed that Mr. Dickson had been able in the month of December last to effect a saving of 2·32d. per 1000 cubic feet. It occurred to him (Mr. Masterton) that as their total carbonizing costs at the Granton works came to little over 1d. per 1000 cubic feet, surely Mr. Dickson's previous figures must have been rather high? Of course, it would be desirable to know all the items included under the heading "carbonizing costs," and the particular type of settings which was employed. Then again he considered they were deeply indebted to Mr. Dickson for going so fully into working costs, as the available data on the subject had hitherto been rather meagre and somewhat confusing. On this point the author had assuredly given them a great deal of useful information. He (the speaker) was rather surprised, however, to learn that Mr. Dickson's quantity of coke per ton had been lessened, as in connection with their experimental vertical bench at Granton the quantity of gas made per ton had increased, and, furthermore, it was of a superior quality. The quantity of tar was practically the same; but it was of better quality. On the other hand, they found that the production of sulphate of ammonia increased by about 20 per cent.—equal to 7d. per ton of coal carbonized. There was no question that Mr. Dickson was to be congratulated on his later results—namely, obtaining a make per ton of 10,808 cubic feet, an illuminating power of 17 candles, and a calorific value of 583 B.Th.U. net. In course of time the author would be sure to have a great deal of additional information to disclose; and they earnestly hoped he would supplement his present creditable effort for the benefit of the members of the Association.

Mr. ALEX. WILSON (Glasgow) remarked that this was one of the times when one was afraid to say very much. It would be noticed from the paper that the author had had a great deal of trouble at the outset with his verticals, due to local considerations. They would further notice—if they had been in a position to read the paper at all carefully—that Mr. Dickson had emerged successfully from his troubles. In every case where trouble was mentioned it was explained towards the end that the difficulty had been got over. In starting any new apparatus, almost invariably, there was some trouble. Mention was made in the paper about the sticking-up of coal at the top of the retorts; and at Johnstone they had found that most of the trouble took place right above the retorts, in the mouthpiece. The coal sort of boiled up there, and hung-up in the mouthpiece. Mr. MacLeod, of Dawsholm, had been able to get over the difficulty by using a dipping rod, and so soon as the coal filled-up in a retort the men saw by a slight movement of this particular rod when it was at a proper height. Mr. Dickson had mentioned the difficulty in regard to pitch, although it was to be observed that Mr. Robertson, of Dunoon, had so far not had any trouble in this connection. He (Mr. Wilson) thought that with all vertical retorts and with all retorts where they had a fairly high heat, they had more or less this thickening of pitch. It was to be noted, however, that with some of the other systems, they were arranging to wash-out the hydraulic mains with ammoniacal liquor, &c., and in point of fact a great many different remedies were being employed to get the thick pitch carried away. In Glasgow, they got the thick pitch and the coal dust drawn down to the bottom of the hydraulic mains. Frankly, he thought it was better to tackle the difficulty (which was not a serious one) right away at the point where they knew they could find it. Once they got it down to the bottom of the hydraulic mains, they made a practice of taking it regularly away. In this way all trouble was obviated, because ridding themselves of it regularly ensured that they would not be bothered with it afterwards. A great deal of Mr. Dickson's trouble at Johnstone had been due to a shortage of storage at the works; and he (the speaker) believed that most of them would readily sympathize with the author so far as this was concerned. It really did not matter what their system of carbonization was, if there was a shortage of storage, it always led to a considerable amount of anxiety and loss. In the case of vertical retorts, he was bound to say that the anxiety was very much increased. With reference to the quantity of coke, it was to be admitted that there was not the same output from the verticals. The difference was due to this, that from the vertical retort they sent out dry coke, while in the other case it was water-quenched coke. From the vertical retorts they were supplied with a much drier type of fuel; and as a matter of fact they were finding, in consequence of this, that a new class of customer had arisen and was arising for it. Indeed in many instances, by supplying the dry vertical materials, they were cutting out foundry coke. There was just one other point to which he would draw attention. It was not noticed in the paper, that after a man had charged his vertical retort he was free from any anxiety until the next charge came on. In smaller works this was a decided advantage, because it enabled the individual in charge to go away and attend to other matters of detail with an easy and free mind, instead of having to rush back at intervals and do a certain amount of probing and so on. He had to thank Mr. Dickson for the full report he had given, and for the wealth of detail in his figures. It was very creditable indeed to the author that he had overcome the many difficulties which beset him at the outset.

Mr. J. B. SCOTT (Cowdenbeath) also desired to congratulate Mr. Dickson on the splendid paper he had contributed to the Association dealing with his installation of vertical retorts at Johnstone. Nevertheless, from what he had just heard, he was half-inclined to say that, so far as he could see, the system of vertical retorts was principally a large piece of labour-saving apparatus. Most of the saving the author put forward was an economy in wages; and, as Mr. Masterton pointed out, there had actually been a saving of 2·32d. per 1000 cubic feet made in the month of December. In his own works at Cowdenbeath, where they were working with ordinary horizontals, the total carbonizing costs for wages and so on came to something like 3d. per 1000 cubic feet. So far as memory served him, he believed he was correct in stating this figure. If he was to think of introducing vertical retorts, and look for a saving of 2·32d., he would be forced to the conclusion that to obtain it he would require to produce gas at a fraction of a penny per 1000 cubic feet. It seemed to him that the introduction of vertical retorts was greatly assisted by the working conditions that were in existence before the change was made. In his own case, for example, he could never hope to bring out the same results with verticals that he was presently doing with horizontals—he meant financial, not the working, results. Towards the end of his paper, Mr. Dickson made the following statement: "There is every indication of the installation showing a 10 per cent. return on a full year's working, and a scheme of handling coke will increase that figure." This was really the main point, because every gas company looked for a return of something like 10 per cent.; but over and above this, they required something for a renewal fund. In point of fact, a new plant had to be able to earn more than 10 per cent. before they could actually recommend it. At the works where he was in charge, they were going along satisfactorily with a fairly good installation of horizontals; and he had not been able to see where it would pay them to make a complete change to verticals. There was a possibility of putting up a unit, and gradually making the change over an extended period; but he did not think it would be advisable—in fact, it would be a dead-loss—to discard their horizontals at present and instal verticals. It was refreshing to hear Mr. Dickson detailing his difficulties, and the way he had dealt with them; and, although he might not yet have got over them all, they were bound to be swept away in time. The main point to be considered in making a change of this kind was the question of "*£ s. d.*"

Mr. WALTER GRAFTON (Glasgow) said the figures given in the paper, of a fuel consumption of 16·42 lbs. of coke per 100 lbs. of coal, seemed to him to be far too high for this setting. He was of opinion that it should be less, because it was indicated in the paper that there was no heat loss in the waste-gas flues, and also the coke made was withdrawn cold, showing a conservation of heat as compared with that from horizontals. Altogether, it was most unfortunate that Mr. Dickson had not better hopes for vertical retorts in so far as the yield of coke was concerned. With regard to the quality of gas, although the author said there were improvements, his figures did not quite bear them out. The probability was that, unfortunately, Mr. Dickson's tests had led him astray. It was quite apparent to him (Mr. Grafton) at least that the values of the analyses did not bear out the practical results. As to the pitch, there was surely some error with the sampling of the tar, since the author showed slightly under 40 per cent. by weight of pitch, and this would never pay. Then as to the sulphate of ammonia, it appeared to him that there was evidently something wrong with the calculation given in the paper. The author only showed 29·48 lbs. of sulphate, and yet he got 55—or slightly over 55—gallons of liquor of a value that was not quite understandable. Although he (the speaker) was pointing out these little discrepancies, he by no means wished to depreciate the value of the paper Mr. Dickson had submitted to them. At the same time, he was bound to say he could not quite understand many of the figures and analyses as they had been presented.

Mr. W. BLAIR (Helensburgh) desired to thank Mr. Dickson for the paper he had brought forward, and for so lucidly stating his experiences in relation to vertical retorts. His experience had been unique in this respect, that he had entered upon his duties while the retorts were in course of installation; and, moreover, he had not been responsible in any way for the adoption of the vertical system. It was to his credit that, having entered upon his duties in this way, he had got over the difficulties which he was bound to encounter, and had carried the installation through to a successful issue. From his (Mr. Blair's) own experience with verticals, he thought Mr. Dickson was to be warmly congratulated on the results he had attained. Although he had personally had no experience of the "continuous intermittent" system, he could not see that there would be a great deal of difference in them as compared with other vertical retorts. It was sufficient for him,

he thought, to be able to say that, if he had his own experience to go over again, he would be inclined to stick to his "first love." Anyone in charge of works requiring extensive alterations, and at a place where the bench was pretty well worked-out, would do well to consider the expediency of introducing vertical retorts. As Mr. Scott had remarked, it was a question of "£ s. d." They had more particularly to consider their own special circumstances and conditions. So far, sufficient experience had been gained with vertical retorts to enable a manager to make a wise and judicious choice. Naturally there were difficulties contingent on the setting-up of new apparatus which any person would meet, supposing (say) it was twenty years hence. They in Scotland, too, were differently situated from those in other places inasmuch as they had so many varieties of coal, all of which required some different treatment. They were able to carbonize any class of coal in vertical retorts; but when they had three varieties of coal in the retorts at one time, it was then that the difficulties came in. At Helensburgh they had found no difficulty in working with any class of coal so long as they paid attention to it; but it was when they changed the coal, probably two or three times in the 24 hours, that the difficulty came in. It was then they might be subject to hanging-up. On the other hand, if they adhered to the one class of coal continuously, they would have no difficulties. With regard to pitch-tar, experience had shown that with some varieties of coal they got a greater quantity of pitch than with others. He had been working with vertical retorts for three years and two months; and he was bound to say that he had not got 10 cwt. of pitch-tar in the whole time. So far as hanging-up was concerned, the only time they had been subjected to it was when they were working very "fat" coals. Only on perhaps four or five occasions altogether had they experienced any serious trouble, and then they got over the difficulty by allowing the retort to burn itself out.

Mr. Lawrence Hislop (Uddingston) said there was one question he would like to ask Mr. Dickson with regard to his fuel consumption. It seemed to him (the speaker) unfair that it should go out through the Technical Press that it required in the Glasgow system a fuel consumption of 16·42 lbs. of coke per 100 lbs. of coal, and even as high as 18 lbs. of coke when they were pressing the settings to get a greater yield of gas per ton of coal. Was this fuel consumption for the producers only, or did it include boiler fuel or any other coke used in the works for power-generating purposes? The builders of the intermittent system were freely giving guarantees of from 10 to 12 lbs. of coke per 100 lbs. of coal carbonized (when the ash in the coke did not exceed 6 per cent.); and the difference between this and the figure given by Mr. Dickson for the Glasgow system would mean a considerable difference in the revenue from coke on a year's working. With regard to pitching troubles, if Mr. Simpson, of Cambuslang, who had now had the intermittent system working with ordinary Scotch coals for over a year, were prevailed upon to speak, he could tell them that he had never had anything but very thin tar in his mains from the day he started the system.

Mr. Andrew MacLeod (Dawsholm Works, Glasgow) said he had every confidence in the accuracy of the appended tests, which he had pleasure in placing before the meeting:—

Test on Dawsholm Verticals from April 20 to May 10, 1914.

[Line A, week ending April 26; B, May 3; C, May 10.]

—	Coals Carbonized.	Gas Made per Ton (Cor.).	Illum. Value. No. 2 Met.	Calorific Value.		Tar per Ton.	Sulph. Am. per Ton.	Coke Used per 100 Lbs. of Coal. Dry.
	Tons.	Cub. Ft.	Candles	Gross.	Net.	Galls.	Lbs.	Lbs.
A . . .	2121·90	10,496	18·18	574	519	13·0	32·2	16·14
B . . .	2109·75	10,471	17·24	573	516	12·2	33·2	14·95
C . . .	2055·65	10,479	17·68	585	527	12·8	31·8	14·95
Average.	2095·76	10,482	17·70	577	520	12·6	32 4	15·34

Crude gas from horizontal retorts contains about 95 grains per 100 cubic feet.
For the week ending April 26, the cyanogen was 38 grains per 100 cubic feet, and for that ending May 10, it was 45 grains – an average of 41 grains.

Analysis of Tar.

Week ending	April 26, 1914.	May 3, 1914.	May 10, 1914.	Average.
Specific gravity	1·117	1·130	1·125	1·124
Free carbon, per cent. . . .	8·80	10 80	10·00	9·80
Ammoniacal liquor, per cent., volume	8·75	6·75	8·00	7·86
Light oil	5·75	8·25	6·50	6·83
Carbolic oil	10·25	17·50	19·25	15·66
Creosote oil	10·00	9·37	5·00	8·12
Anthracene oil.	18·00	16·12	15·50	16·54
Pitch.	47·25	42·01	45·75	45·00
Twisting-point of pitch, deg. Fahr.	126·00	181·00	162·00	156·00

Mr. MacLeod added, for the information of the meeting, that the ash in the coke at Dawsholm ran from 14 to 17 per cent.

Mr. Alex. Waddell (Dunfermline) wished to join with Mr. Lawrence Hislop in expressing the view that perhaps better work could have been done by Mr. Dickson in regard to the fuel consumption—that is, coke per 100 lbs. of coal. His (the speaker's) opinion of vertical retorts from the time he had given attention to the subject was that there was a considerable amount of heat wasted on the larger surface. Something ought to be done to avoid this to a large extent before they had accomplished all they should do. In spite of what Mr. Blair had mentioned, he (Mr. Waddell) had experienced no difficulty in using different varieties of coal. Indeed they at Dunfermline had lately tried an English coal that was practically all gum; and even with this coal no difficulty had been found. He believed this arose on account of the fact that they had two off-takes—one at the top of the retort and the other at the bottom. If they put coal into the retort and did not allow it to stay sufficiently long in one position to get, as it were, caked into a mass, it had a tendency, so far as his experience showed, to make the coke much smaller. He thought there was hardly any doubt on this point. Quite lately he saw a new process—perhaps he was not entitled to say where it was, but, at any rate, it was not a hundred miles from Glasgow—where the coal was kept moving; and the result there again was that the material was small. On the other hand, they might have coal of such a strong coking nature that even with the movement he had spoken of, it might come out big enough. If they had such a class of coal then the continuous movement was all right; but if they had the average coal to be bought in Scotland, they would find that it would come out too small at the bottom.

Mr. Dickson in replying to the discussion, said he would do his best to answer all the points that had been raised—to his own satisfaction at least, although he did not say he would be in a position to satisfy all his critics. Mr. Young, it would be noticed, considered from his experience that 1000 cubic feet more of gas could be produced with a slightly reduced candle power, and he thought that his (Mr. Dickson's) results exactly confirmed this view. Mr. Robertson had given his opinion that if he had to consider the question again of introducing vertical retorts, he would do as he had already done. He was quite willing to admit that Mr. Robertson might have advantages over the system in vogue at Johnstone; but his position was that while he was not responsible for the inauguration of the Johnstone scheme, he would nevertheless now, if called upon to act on his own initiative, follow the very same lines. In his remarks further on, Mr. Robertson touched upon the necessity for a careful selection of coal, if smooth and regular working were to be maintained. This was a point, however, to which he (Mr. Dickson) had not found it necessary to as yet give a great deal of attention. Mr. Masterton asked for particulars of the various coals which had been employed to produce the yield of gas per ton set forth in the paper. On this point, he had to say that the market had this year favoured vertical retorts in the choice of coal. The comparative difference was 2s. 2d. per ton in favour of the bigger make. Mr. Masterton also inquired as to carbonizing costs, and the figures in this instance were 1s. 2d. per ton, as against 3s. 1d. for the month of December. These comparative carbonizing figures per ton of coal embraced a due proportion of supervision and maintenance, coal-handling, carbonizing, filling coke into waggons, or stacking and trimming (sometimes to a height of 14 feet), and the whole of the steam-raising on the works. Mr. Wilson inclined to the view that with all vertical retorts, pitch was more or less formed. He rather thought, however, from the results Messrs. Blair, Robertson, and Simpson were getting—although the latter gentleman had not spoken—that with the Glover-West vertical retorts there was not the same inclination to produce pitch. He thought that this must be stated as being borne out by the results. He knew all Mr. Scott's circumstances in Cowdenbeath very well; and he was bound to say that, with his present arrangements for handling and carbonization, he would not be justified in going in for vertical retorts. The figure of 16·42 lbs. referred to in the paper was the average from the beginning of their financial year till the end of July of the present year—a period of 2½ months. It was well to point out that the number of retorts during a part of this time was in excess of the requirements, and there was, therefore, a higher fuel consumption. With regard to the figure of 8·78 cwt. per ton of coal carbonized, he thought it was quite equal to any Scottish result that had been achieved in a first year's working with vertical retorts, taking into account particularly the loss of fuel in keeping the draught adequate. He was quite at a loss to understand Mr. Grafton's criticism. Did Mr. Grafton mean that he was not putting in enough of coal there, or that he should use better coal in its place? He was perfectly certain he was getting everything out of the coal he was using in the carbonizing process. They were getting every ounce of volatile matter out of the coal, and he did not think that this would be the case if much more than 3 tons were put through the retort in 24 hours. Mr. Lawrence Hislop raised the question of the fuel used, and mentioned his guarantee of 10 lbs. He hoped in the course of a year or so they would be able to hear from Mr. Hislop that he had obtained his guaranteed figure. He was glad that Mr. MacLeod had spoken, because his tests had borne out the figures given in the paper relative to fuel.

North of England Gas Managers' Association.—The Hon. Secretary (Mr. Herbert Lees, of Hexham) announces that, owing to the unsettled state of the country consequent upon the war, the Committee have deemed it expedient to postpone the autumn meeting of the Association. Should circumstances be favourable for holding the meeting at some later date, arrangements will be made accordingly.

SPHEROIDAL GASHOLDER TANKS.

By Paul Seurot, of Montreal, Canada.

[From "Engineering News" of U.S.A.]

The usual formula giving the thickness, e, of the plating in a gasholder tank is:

$$e = \frac{HD}{2KS}$$

in which H is the height of the tank, D its diameter, K the ratio of the strength of a riveted section to the strength of the solid section, S the unit-stress.

The intention of the designers of this spheroidal gas tank (the Machinenfabrik Augsburg-Nürnberg) is to replace the straight vertical wall of the tank, subject to unequal stresses and necessarily very thick, by a curved and flexible wall stressed equally at all points. This curve follows exactly the natural curvature of a drop of water or of a thin rubber-silk bag filled with water, suspended by a string and resting on a flat unyielding base—see figs. 1 and 2. This bag and its contents then take such a shape or position of equilibrium that there is no shear in the shell at any point, the stress being purely tensile.

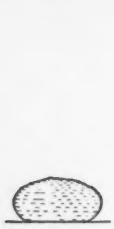


Fig. 1.

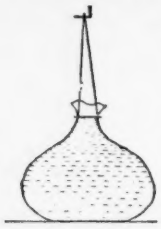


Fig. 2.

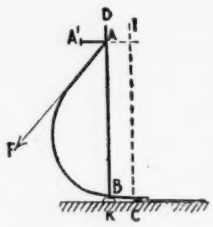


Fig. 3.

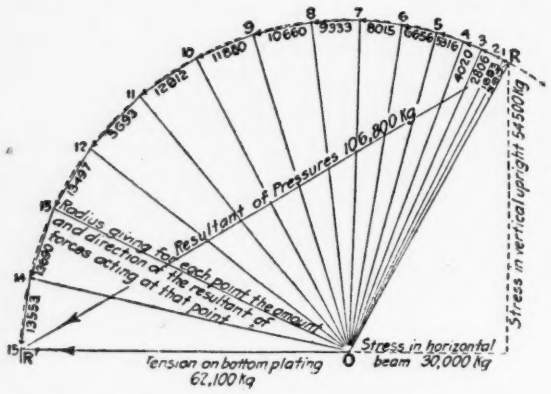

Resultant of Pressures 106,800 Kg
Radius giving for each point the amount and direction of the resultant of forces acting at that point
Stress in vertical upright 545001kg
Tension on bottom plating 62,100 kg
Stress in horizontal beam 30,000 kg
O
R
R'

Fig. 4.

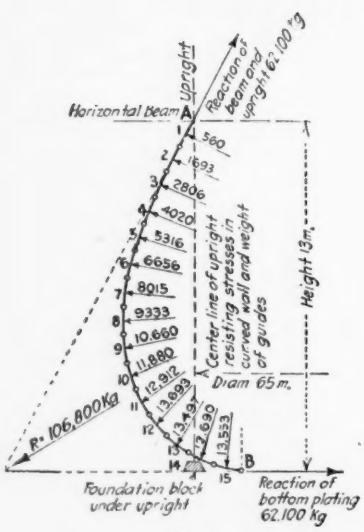


Fig. 5.

Fig. 6.

As pointed out in the article in an earlier number of the "Engineering News," the tank cannot be a closed figure and the meridian tension must be counteracted by vertical struts. This is shown in fig. 3. The resultant force at A is tangential, and acts along the line AF. This force is resisted by a circular horizontal built beam AA^1, and by the vertical struts DAB, which are connected together by X-braces.

The vertical struts are carried on foundation blocks K through the tank plating. The cylindrical volume of water within the surface IC is supported directly by the bottom plating and foundation. The volume comprised between IC and the shell produces a downward pressure which is carried through K on to the foundations.

To draw the curve of the shell, let us assume the problem solved and let AB (fig. 5) represent the curve which is supposed to resist equal tensile stresses at all points. Let us take a slice 1 metre wide on the circumference of the opening, and let us divide the curve into a certain number of equal parts. In the present example, there are fifteen divisions, each 1·10m. long. At the centre of gravity of each of these divisions, and normally, let us draw the water pressure, calculated for each point by multiplying the area of the section, its width by its length, by the height of its centre of gravity below the top surface. Drawing these forces one after the other, parallel to their direction and proportionately to their value, we get a polygon of forces (fig. 4), whose closing line RR^1 is parallel to, and (measured by scale) equal to, the resultant RR^1 of the several pressures. The lines RO and R^1O parallel to the two reactions at the end of the curve give the value of the tensile stresses on the base plating and at point A.

If we join the intersection of these reactions (fig. 4) to the several points of the polygon, we obtain the value and direction of the resultants of all the tensile stresses at each point in the shell. All these resultants must be equal, since the curve is supposed to be such that all the tensile stresses are alike. Therefore, *these lines must be the radii of a circle whose centre is the intersection of the reactions*, and passing through the several points of the polygon. In other words, we should be able to inscribe the force polygon within this circle.

If now we draw the equilibrium polygon by laying, at each point of the curve, lines parallel to the rays of the force diagram, the sides of the equilibrium polygon will be tangent to the curve of the shell, and if we started at the lowest point the last side should pass at the top through the point A.

In practice, the lower and higher points being given, it is customary to draw a trial curve, applying the hydrostatic pressures at each division. The force diagram corresponding to these pressures being drawn, it should be possible to inscribe it in a circumference if the original curve was correct. A few trials may be necessary to obtain the proper curve.

The weight of a tank designed along these lines will be about two-thirds of the weight of a vertical-side tank for the same unit-stress.

For instance, for a tank 13 m. high and 65 m. in diameter, with a unit-stress of 10 kg. per sq. mm., the thickness of the lower plating should be, in a cylindrical tank,

$$e = \frac{65 \times 13}{2 \times 10} = 42 \ mm.$$

The thickness at the top would be from 6 to 7 mm. In a spheroidal tank, the thickness e would be constant and equal to:

$$e = \frac{62{,}100 \ kg.}{950 \times 10} = 6{\cdot}5 \ mm.$$

In practice, a uniform thickness of 8 mm. would probably be adopted.

The above conditions obtain when the tank is full. When the tank is being filled, the tensile stresses induced in the wall are not equal. In order to avoid deformation of the shell during the filling operation, the shell is connected to the vertical uprights by means of latticed girders (fig. 6). The rivets connecting the latter to the shell cease to be under any stress when the tank is full, at which time the latticed girders could be left out altogether.

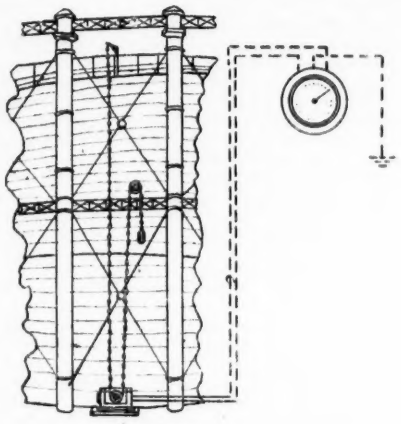
In the case taken here as an example, the water pressures have been determined as follows:

No. of Points.	Development of Skin, M.	Length of Skin M.	Area, Sq. M.	Head M.	Pressure, Kg.
1 . . .	1·020 ..	1·100 ..	1·122 ..	0·500 ..	560
2 . . .	1·040 ..	do. ..	1·144 ..	1·480 ..	1,693
3 . . .	1·050 ..	do. ..	1·155 ..	2·430 ..	2,806
..	..	..	..	..	..
..	..	..	..	..	..
14 . . .	0·980 ..	do. ..	1·078 ..	12·700 ..	13,690
15 . . .	0·950 ..	do. ..	1·045 ..	12·970 ..	13,553

A Standard of Safety for Water Supply.—In the introduction to the eighth annual report on the results of the chemical and bacteriological examination of the London waters which has just been issued by Dr. A. C. Houston, the Director of Water Examination to the Metropolitan Water Board, he states that he is frequently asked by persons interested in water undertakings what *B. coli* standard should be adopted in judging the safety of a water supply. His answer is that everything depends upon the local circumstances, and a standard suitable for one place may be too high or too low for another. To the following extent, however, it is, he says, possible to be definite: The Thames and Lea rivers, in about half the samples examined, contain typical *B. coli* in 0·1 c.c. or less. Yet it has been abundantly shown that it is possible, at a not impracticable cost, so to purify these raw waters that the final product contains no typical *B. coli* in 100 c.c. of water in over 80 per cent. of the samples examined. Hence it may be said there seems no convincing reason why, generally speaking, the absence of typical *B. coli* from 100 c.c. of water examined in a majority of representative samples should not be taken as a "working" standard.

NUGENT'S GASHOLDER LEVEL INDICATOR.

Messrs. Mansfield and Co., of New Brighton, direct attention to this appliance, which will indicate at any distance, by electrical means, the rise and fall of the gasholder to which it is fixed.

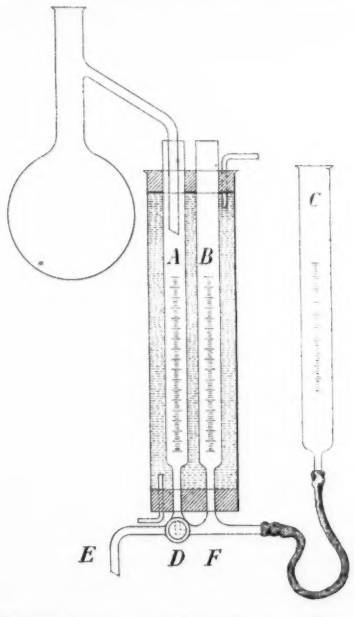


For every 6 inches rise and fall, a contact is made that sends an electric impulse over the wire to the indicator, which shows on a dial the exact height of the holder in feet and inches. The indicator may be placed in any position—such as the engineer's office or under the observation of the exhauster attendant. The indicator can be fitted with an attachment which will ring an alarm bell when the holder reaches a critical level. As is pointed out, by the use of this appliance there will be no more overfilling of holders, no more blowing gas to waste, and no need to watch the height of the holders. The engineer can know to an inch the height of the holder at any minute of the day, even if it is hundreds of yards from his office; and the exhauster attendant can be automatically warned by means of a bell whenever the holder reaches a critical level. The Nugent level indicator may also be fitted in the same way to tar or liquor tanks, so that there is no possibility of overfilling or waste.

FRACTIONAL DISTILLATION OF PETROLEUM.

A paper on this subject, by Mr. James M'Connell Sanders, appeared in a recent issue of the "Journal of the Chemical Society."

In the examination of petroleum, it is often desirable to determine the specific gravity of successive fractions, as a regular graduation in such densities indicates a pure natural oil. More often than not, however, the quantity of oil available for testing



is so small that specific gravity determination of the fractions by the usual rapid methods is not possible. To avoid this loss of time, the author has devised an apparatus which allows the specific gravity determinations to be made simultaneously with the fractionation.

The apparatus shown in the illustration is self-explanatory. A and B are graduated—the scales showing heights above a common datum line, which is made the zero point on each tube. This graduation may also be made to indicate the contents of each tube. If this is not done, the relation between the scale-indications and the volume-contents of the tube must be determined.

To conduct a distillation and determine simultaneously the specific gravity of each fraction, the distillation flask is placed in the position shown, and charged with the oil. A suitable amount of distilled water is poured into C; the tap D being in the position shown. By means of the levelling tube C, the water in A and B is brought to the zero of the scales, and the distillation commenced. As the distillate collects in A (floating on the water column therein) the levelling tube C is continually adjusted so as to keep the line of separation between the oil and water at the zero point on the scale. A little time before the required amount of distillate has passed over, the source of heat is removed from the distillation flask; and as soon as the fraction is complete, the column of water is adjusted to the zero point on the tube A, and the heights of the columns in A and B are read, together with the temperature of the water jacket. From these readings the specific gravity of the oil fraction is readily calculated, as in the well-known method of "balancing columns."

C is now lowered, so as to withdraw all the water from A and leave the perforation in the tap full of distillate. The tap is then given a quarter-turn to the left—allowing the distillate to flow out of the tube E, to be collected for subsequent examination. On turning the tap back to its primitive position, the distillation can be proceeded with, and successive fractions treated in the same manner. When the sample under examination contains much water, its amount can be approximately determined by the increase in volume of the total water in the apparatus, as shown by the graduations on C.

In cases where it is not required to collect each fraction separately the determinations of specific gravity may be made at any stated intervals of time, volume, or temperature; and a curve drawn from these will show the gradual change in density during the distillation, or the effect of "cracking" a crude oil.

EDUCATION AND CERTIFICATION OF GAS-FITTERS.

Equipment Recommended for Classes.

A schedule of equipment, as subjoined, for the use of classes of students in "Gas-Fitting" is recommended by the City and Guilds of London Institute, who have now added this subject to their programme of examinations. In asking us to publish the schedule, Mr. Walter T. Dunn, the Secretary of the Institution of Gas Engineers, says the Council trust that, as the result of the letter issued by the Institution to the members on the 10th ult. [*ante*, p. 401], a large number of classes will be held at technical colleges and other teaching centres throughout the country.

Gas-Fitting.

EQUIPMENT RECOMMENDED FOR THE GAS-FITTERS' WORKSHOP.

The tools named below are suggested as being the appliances suitable for a class of about twelve students:—

- 2 Ratchet braces, with centre, rose, and twist bits.
- 3 Pipe vices (up to ¾ inch pipe).
- 3 Pipe cutters (,, ,,).
- 3 Sets of stocks and dies for gas threads, ⅛ inch to ¾ inch.
- 3 Sets of stocks and dies for brass, ⅜ inch and ½ inch.
- 3 Plug and taper taps for iron, ¼ inch, ½ inch, and ⅜ inch.
- 3 Plug and taper taps for brass, ⅜ inch and ½ inch.
- 2 Tap wrenches for above.
- 2 Screw plates, 16 holes.
- 6 Pipe tongs and grips, ½ inch, ¾ inch, and 1 inch.
- 3 Footprints for ⅛ inch, ¼ inch, and ⅜ inch iron.
- 1 Cyburn spanner up to 1¼ inch.
- 4 Universal gas pliers, 7 inch.
- 2 Coupling pliers, 10 inch.
- 4 Burner pliers.
- 2 Broaches and burnishers.
- 2 Water gauges, 4 inch.
- 1 Pipe bending machine, up to ¾ inch iron.
- 6 Fitters' hammers.
- 6 Flat chisels.
- 6 Screwdrivers (various lengths).
- Twist drills, $\frac{5}{64}$ inch, ⅛ inch, and $\frac{7}{16}$ inch (3 each).
- Whitworth taps for do. (two each).
- 6 Pocket blow lamps.
- Metal pot and ladle for wiped joints.
- Jointing and wiping cloths.
- 6 2-foot steel rules.
- 1 Gas soldering iron stove.
- 3 Soldering irons (straight).
- 6 Shavehooks.
- 6 Tanpins.
- 3 Dressers.
- 6 Tallow and resin boxes.
- 6 Plumbers' pocket knives.
- 1 Hack saw, 12 inch.
- 2 Spirit levels.
- 3 Paint pots and brushes.
- 3 Pipe openers.
- 6 Gimlets.
- Solder for blown joints.
- Fluxite.
- 2 Half-round rasp files, 12 inch.
- 3 Square and half-round Bastard files, 12 inch.

The following may probably be obtained on loan from the makers or local gas undertaking:—

- Wet and dry meters in sections.
- Samples of upright and inverted gas-burners (Bray, Welsbach, "Nico," "Veritas," and other well-known makers) all fitted with air and gas adjusters.
- Gas-cooker.
- Gas-griller.
- Gas boiling-burner.
- High-pressure gas-compressor and gas-engine.
- High-pressure lamps.
- Low-pressure inverted burner lamps for outside lighting.
- Distance lighting appliances, pneumatic "Switchon," and "Telephos."
- Gas fires, radiators, circulators, geysers, and water-boilers.
- Gas-furnaces.
- Gas-governors.
- Thorpe pressure-register.
- Harrison's or Borden's pressure-gauge.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

English Mantles.

SIR,—With regard to the correspondence which has lately appeared in the "JOURNAL," may we, as one of the pioneers of the incandescent industry established since 1894, say a few words?

We were instrumental with others in breaking the monopoly which then existed, and the destruction of which has since so much benefited the gas companies and the community at large.

We are in a different position to one of your correspondents in this respect—viz., that we are not now trying to buy English-made mantles for the first time, as we have both bought and tried to buy them in the past, as you will see from enclosed invoices. But this is *entre nous;* our real object in writing this letter to you is as follows.

We were approached by the representative of a firm of whom we bought mantles before the war, who advised us that they had in hand some special weaving for making up about a hundred gross of mantles. This special weaving they had procured for us before the war; and we presume they did not have to pay an advanced price for it.

We were prepared to relieve them of this special line, and naturally would not have objected to pay a reasonably advanced price for it, owing to the war—a price say of 9s. per gross more, as was suggested by Mr. Carpenter, of the South Metropolitan Gas Company. But here is the point of our letter. You may judge our surprise when (as you will see from the correspondence enclosed) we were asked 36s. per gross more than the price we had been previously charged. Furthermore, we had offered to the same firm thorium at a cheaper rate than that at which it was offered to manufacturers by the Gas Company; and our reply was "that they were full-up for thorium"—thus showing that they had a sufficiency of cheap thorium, and, therefore, the shortage of this article could not be the reason for the advanced price they asked.

Now it is very patriotic of the daily journals and the trade papers to say that we should push English mantles; but we would ask you how we are to do this, when the English maker treats the merchant in the manner we have described in view of the documentary evidence you have before you.

We should like the views of others on this point.

WHOLESALE FITTINGS COMPANY, LTD.,
per F. C. BARNETT, Commercial Manager.

23 to 27, *Commercial Street, E., Sept.* 8, 1914.

Supply of Gas-Mantles in War Time.

SIR,—The paragraph on p. 583 of your issue of the 8th inst., cannot be allowed to pass without comment. Mr. Thacker is reported to have said: "It was worth noting that there were only four mantle makers in this country, and between them they only make 25 per cent. of the mantles used here." As a matter of fact, there are nine mantle factories in this country—seven British owned and controlled, one entirely German owned, and one German controlled. Between them, they manufacture about 45 million, which is very nearly 50 per cent. of the number consumed in this country.

Furthermore, Mr. Thacker is wrong in stating that the thorium preparation and clay rings for inverted mantles were all imported from the Continent. We have for years advertised that we have been using British-made thorium; and, owing to this fact, we are in the position to continue manufacturing in spite of the war. As to the clay rings which we use, these are made at Earlsfield, within a mile of our own factory.

It is, therefore, difficult to see how there can possibly be a "famine in mantles before long." Had the members of the Birmingham Ironmongers' Association, and the Birmingham Master Gas-Fitters' Association been sufficiently patriotic in the past as to give greater support to the British manufacturers, instead of buying practically the whole of their supplies from Germany, British manufacturers would have been in a much stronger position to-day. Birmingham is the home of Tariff Reform; but when we find, from the Corporation Street-Lighting Department downwards, that there has been a persistent policy of buying German-made mantles, we are somewhat surprised at the present outcry which has come from that city.

If the members of the Associations referred to will only apply to the *bonâ fide* British manufacturers, they will find no difficulty in getting all the mantles they require.

VOELKER LIGHTING CORPORATION, LTD.

Garratt Lane, Wandsworth, S.W., Sept. 10, 1914.

Aniline, Benzoic Acid, and Salicylic Acid.

SIR,—Having seen a note in your issue of Sept. 8, with reference to the manufacture of aniline, we would suggest that your correspondent must have received an erroneous idea as to the inability of British manufacturers to supply this article. We might say that we ourselves are able to supply all the aniline (either oil or salt) that is required in this country, and shall only be too pleased to have the opportunity of doing so.

READ HOLLIDAY AND SONS, LIMITED.

Huddersfield, Sept. 12, 1914.

Ballymena Gas Undertaking.—According to the report of the Auditors, the total revenue for the past financial year amounted to £6237, and the expenditure to £5077, showing a profit of £1160. When the figures were submitted to the Council, the Clerk pointed out that (allowing for interest and sinking fund charges, &c.) the works were paying their way. They did not want a big surplus, because they would have to pay income-tax. Proper financing meant the balancing of their income and expenditure.

REGISTER OF PATENTS.

Vertical Coking Retorts.

LÜTZ, J., of Bredeney, Germany.

No. 17,887; Aug. 5, 1913. Convention date, Aug. 5, 1912.

This invention relates to a process and device for continuous working of vertical coking retorts, on lines very similar to gas-retorts.

According to the invention, the coals are continuously supplied, and the whole contents of the retort are constantly lowered slowly from time to time; the lowest portion of the coke cake from which the gas has been exhausted being removed. This is done automatically as the consecutive operations can be fulfilled by the moved parts. The vertical retort chamber terminates at the bottom in an air-tight casing in which the bottom is mounted, so that it can be raised and lowered and also turned. At the bottom end of the retort, grate-bars are also arranged to be slid into the retort in order to support the material contained in it. During operation, the bottom, with the whole contents of the retort resting on it, is slowly lowered until the finished portion of the coke is below the sliding grate. By introducing the grate-bars, the portion of the contents of the retort which is situated above is supported, while the portion under the grate-bars is caused to slide out quickly. The bottom is then again raised; so that, after the withdrawal of the grate-bars, it again supports the material to be coked, and the slow lowering can be continued.

As during the lowering of the bottom the speed is adapted to the time required for exhausting the gas from the coke, the bottom works the driving devices for the sliding grate and the discharge devices, and consequently the working of further gear, for again raising the bottom and withdrawing the grate, can be brought about by the moved parts. When the movement is produced hydraulically, the moved parts, for instance, merely open and close valves in a given sequence. The slow sinking of the bottom is effected by constantly discharging water through adjustable nozzles from the cylinders containing the plungers supporting the bottom.

Obtaining Products from Materials containing Hydrocarbons.

WILSON, W. G., of Farningham, Kent.

No. 18,406; Aug. 13, 1913. No. 2428; Jan. 29, 1914.

This "joint" invention relates to improvements in "the method of, and apparatus for, obtaining oils and other products from carbonaceous matter or other materials or mixtures of materials containing hydrocarbons—such materials being, for example, coal, shales, absorbent materials containing oil or the like or metal turnings covered with oil, or materials which, while containing oil, are not decomposed by the heat necessary for carrying out the process."

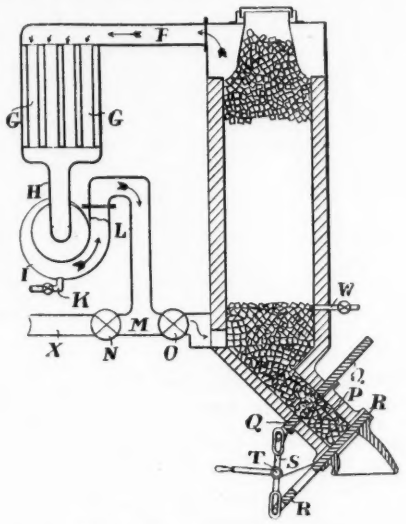
For many years attempts have been made, the patentee remarks, to obtain distillation products from shale and carbonaceous or bituminous substances by the aid either of retorts or of combined combustion and distillation chambers or producers. In both cases it has been recognized that the gases resulting from the distillation process could be reintroduced into the apparatus in order to serve either as the combustible for the production of the heat necessary for carrying on the distillation process or as a carrier for the volatile products resulting from such distillation. The present improvements are concerned with the process which is carried out in connection with a combined combustion and distillation chamber; and it will be necessary, they point out, to enumerate several essential conditions which must be observed in order to deal successfully, on a commercial scale, with low-value materials "which are the first consideration in devising a process and apparatus of this description."

Among the attempts which were made to deal with the problem there was the proposal to employ a vertical chamber or producer into which the shale or other substance was charged and kindled by means of a fire or gas and air; and when the material had burned for a time, and the heat had ascended well up the chamber, air was forced or drawn in (with or without steam) through a number of apertures near the bottom. At a higher level combustible gas, with or without air, was forced or drawn in, and such gas was in some cases a portion of that produced by the process of distillation in the chamber itself. At a still higher level steam was admitted; or more gas was admitted at this last level in addition to, or in place of, the steam—this gas being in excess, and serving the function of stopping combustion and regulating the temperature of the fluids making their exit from the chamber. Or gas with air was admitted at the bottom, and steam at a higher level. From time to time, a door was opened in the bottom of the chamber and a quantity of the spent material was withdrawn, while fresh material was charged in at the top.

Now in order to successfully obtain all the valuable products, it is essential: Firstly, to have a comparatively low degree of temperature at which combustion and distillation take place. Secondly, it is essential to have continuous operation, having in view the fact that every economy must be made in the time occupied, particularly when dealing with material of very low value. Thirdly, it is essential that the person controlling the process be enabled to adjust the conditions under which he carries out the process, and to avoid disturbing the uniformity of these conditions, as, for example, when attending to the discharging of the spent material from the apparatus. Fourthly, it is essential that the gases, before being returned to the chamber, be completely divested of any condensates which they may carry, as otherwise these condensates will be lost when they are passed with the gas through the combustion zone.

According to the invention a low temperature of combustion and distillation is produced by admitting a relatively large quantity of the gases below the combustion zone; a relatively small quantity of air being also admitted. The quantity of air is only sufficient for maintaining the desired combustion, and need not be admitted continuously

but only from time to time. The quantity of gas is comparatively large, because, first of all, it is required to act as a diluent for the air, secondly, it is required to act as a carrier of heat from the hot layers below the combustion zone to the layers above, and, thirdly, it is required to be in sufficiently large quantity to act as an efficient carrier for the distillation products—these latter requiring an adequate medium for floating them away quickly, at the moment they are produced, from the hot zones of the chamber. Having adjusted the quantities of gas and air to suit the materials to be treated and the products to be obtained, continuity of working could not be attained, if, during the frequent removals of spent material, air were to be freely admitted to the apparatus owing to the opening of the discharge opening. An arrangement is therefore provided at this discharge opening which enables spent material to be removed as often as desired without admitting air to the chamber.



Wilson's Coal Distillation System.

The apparatus (as shown in diagrammatic sectional elevation) consists of a vertical chamber made of, or lined with, brick or fire clay, or of metal surrounded by heat non-conducting material, or of metal jacketed externally and provided with a fire-brick lining. The chamber is preferably of tubular form and with its longitudinal axis vertical, or it may be inclined to the vertical, so that as the material it contains is partially consumed or deprived of its distillable products it gravitates towards the lower end. The chamber is provided with a charging door above, with a water seal to prevent the escape of gas and ingress of air when the door is closed. There is also an outlet for the gas at the upper part connected with a duct F leading to a condenser G, consisting of a number of parallel tubes cooled by air or by being enclosed in a jacket cooled by circulating water. From the condenser the gas passes through a duct H to a separator or fan I having an outlet pipe K at the lower portion of its casing, by which the condensed products may be drawn off, and a delivery pipe L leading back to the lower end of the chamber. This delivery pipe is connected to a pipe M having valves N and O. The left-hand end X of the pipe (beyond the valve N) is for the passage of some of the gases to a holder, and, if desired, any bye-products may be recovered from the pipe L or from the pipe X before the gas reaches the holder or place where it is finally discharged. The other right-hand end leads back to the lower end of the chamber, where it delivers the relatively large quantity of gases beneath the combustion zone. The chamber is provided at its lower end with a kind of lock P having sliding valves Q R, each of which is loosely connected at one end to a slotted or forked double armed lever S keyed to the shaft T, which is operated by a hand lever. While working, the valve Q may be open and the valve R closed, so that the coke resulting may pass out of the chamber and be received into the lock P, whereupon the handle is reversed, opening the valve R and closing the valve Q. "In this way the spent material is discharged from time to time without the admission of quantities of air, which would interfere with the combustion of the material being treated and the operation of the apparatus."

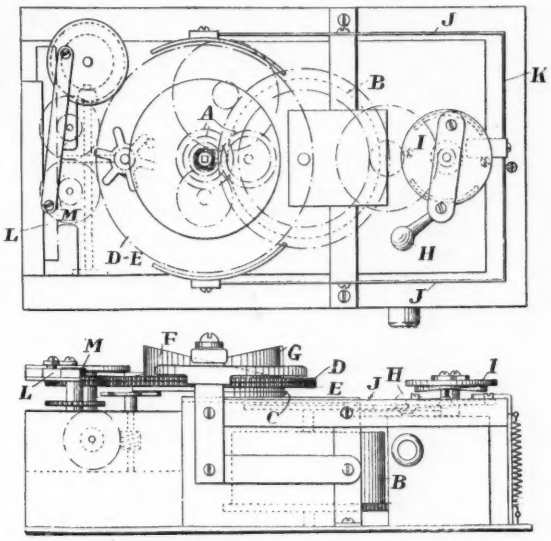
The heat is produced by the combustion of the material inside the chamber, and in any case it is intended that the gases shall enter the chamber by the pipe M in a relatively cool condition. The gases passing through, and also those given off near the combustion zone, are cooled by passing through the material above which has not yet reached the zone of combustion; and the gases, after having passed through the condenser G and the separator I, are admitted to the chamber and become heated in passing up through the spent material which has passed down through the combustion zone, "so that a regenerative effect is obtained."

Lighting and Extinguishing of Gas.

FLYNN, F. W., and MARLEY, F., of Clapham Common, S.W.

No. 18,982; Aug. 21, 1913.

This apparatus for controlling the lighting and extinguishing of gas, is of the type comprising a clockwork movement and adjustable cams operated thereby and adapted to control the movement of a gas-cock through the periodical fall of a weight that has been raised by one of the cams. Means are provided whereby the gas may be turned on at one or more gas-jets throughout any given period (say, one year) at a predetermined time each day, variable according to the season; and after being ignited from a pilot jet and burning for a desired period—also variable according to the season—may again be turned off.



Flynn and Marley's Gas-Lamp Lighter and Extinguisher.

As shown, the apparatus comprises a clock (of usual construction) adapted to be wound only at comparatively long intervals. The clock, through spur gear A, driven from its main spring drum B, rotates a circular disc C, which makes a complete rotation every twenty-four hours. Upon the disc are mounted to rotate freely on a sleeve a pair of toothed discs D E, of equal diameter and of somewhat greater diameter than the disc C. These discs carry ramps or inclines F G, consisting of a cylindrical segment with an inclined edge; the former projecting through an annular slot in the outer disc, so that the ramps can be relatively adjusted by the rotation of their discs.

The control cock H of the gas-pipe is provided with an arm connected at its outer end through a connecting rod to the stud of a crank-disc I, which is subject to the action of a spring tending to rotate it; the arrangement being such that at each semi-rotation of the crank disc the gas-cock is turned from one to the other of its extreme positions—that is, "full-on" or "full-off." In the example illustrated, the disc is rotated from the clockwork main-spring, to the drum of which the disc I is connected through gear; but it may be rotated by an independent spring drum wound either separately, or simultaneously with the main-spring drum through suitable gearing.

The escapement device is arranged as follows: On a pair of studs is mounted to oscillate a frame comprising two longitudinal arms J and a transverse bar K; the free ends of the longitudinal members of the frame extending beyond the pivots or studs, so as to lie substantially at opposite ends of the transverse diameter of the discs C D E. To these free ends there are secured segmental guide-pieces that extend around and in proximity to portions of the periphery of the toothed discs on each side of the ends of the transverse diameter—each guide extending (say) over an arc of 90°.

The setting of the toothed discs and their ramps according to the time and duration of lighting is effected through gearing driven from the main spring drum. This gearing comprises in the example illustrated a rack L engaging with a pinion M forming part of the gear that meshes with the discs. On the same spindle as the pinion M is a spur wheel that meshes with the teeth of the disc D; and the rotation of the spindle is transmitted through gearing, consisting of two equal wheels, to a spindle carrying a spur wheel that meshes with the teeth of the disc E. By this means the discs, with their inclines, are adjusted relatively to each other according to the season; the ramps F G being moved nearer to or farther apart, since the spindles and wheels rotate in opposite directions. The rack L is reciprocated by means of a connecting rod actuated by a crank disc rotated from the main drum through the setting gear, comprising a stud on the under face of the disc C actuating a star wheel which rotates a worm with which there meshes a worm-wheel on the spindle that carries a bevel wheel meshing with a bevel wheel on the spindle of the crank disc. This combination of gearing is so contrived, by suitably selecting the pitch of the worm and worm-wheel, as to have a speed ratio corresponding as nearly as possible to the number of days in the year—say, in practice, three hundred and sixty.

Gas-Fires.

YATES, H. J., of Aston, Birmingham.

No. 18,995; Aug. 21, 1913.

This invention relates to gas-fires comprising a number of radiants or heating elements placed in conjunction with a fire-brick back and the nozzles of a gas-burner.

In well-designed gas-fires, the patentee points out in his specification, no difficulty is experienced in withdrawing all the products of combustion from the fire to the chimney and effectively preventing the escape of any products into the room. The size of the orifice required for proper conveyance of the combustion products to the chimney is, however, limited; and, in consequence, while a well-designed gas-fire does not contaminate the air of a room, it may sometimes impair the ventilation of a room where the ventilation is made to depend chiefly upon the air which will pass through the outlet orifice of the gas-fire. The object of this invention is to enable such gas-fires to be employed

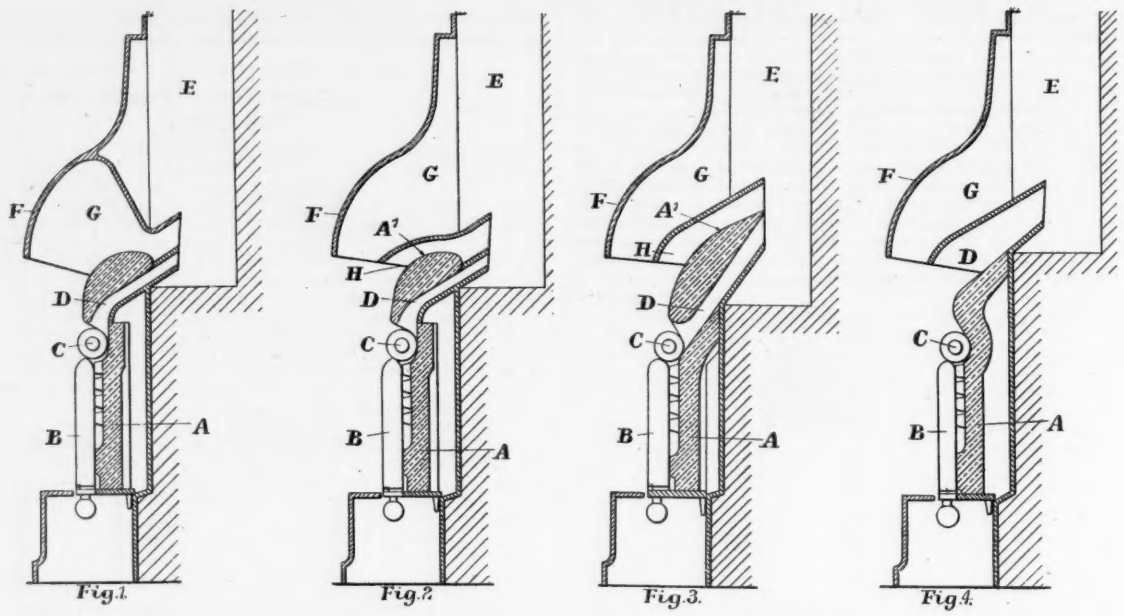


Fig. 1. Fig. 2. Fig. 3. Fig. 4.

Yates's Gas-Fires.

not only for heating purposes without contaminating the atmosphere of a room, but also to produce a more ample ventilation than has been possible with gas-fires hitherto. The invention comprises the provision in a gas-fire as above described, of a pair of outlet apertures from the fire to the chimney—one arranged in a suitable position and of suitable dimensions for the passage of the combustion products, and the other so dimensioned and positioned as to allow of a flow of air caused by the heated products of combustion.

Accompanying the specification, are diagrammatic vertical sections of four gas-fires having the invention variously applied to them.

In the construction of the gas-fire shown in fig. 1, the fire-brick back A, along the lower part of the face of which the usual vertical heating elements B are arranged (with horizontal elements C when these are employed), is constructed, either from one piece or from a number of suitably-shaped separate pieces, to provide a comparatively narrow opening D extending across the front of the grate immediately above the top of the heating elements. This opening forms the passage for the combustion products, is inclined upwards, and communicates with the chimney E. Under the usual canopy F another, and usually larger, opening G is provided. This opening constitutes the passage for air and also communicates with the chimney E. "The two passages may be so shaped and arranged as to form a pair of complementary nozzles, enabling the rapid flow of a comparatively small quantity of combustion products through the one to induce a slower but larger flow of air through the other."

The specification continues: While the passage D is properly proportioned to deal with the combustion products, and is placed relatively to the radiants and fire-brick back in the best position for withdrawing the products to the chimney and preventing escape into the room, the passage G is situated sufficiently far from the radiants to avoid any serious cooling effect upon the fire by the air flowing into that passage. By the provision of two passages for the combustion products and air, as described, it is found that, without loss of efficiency, a gas-fire can be utilized for promoting greater ventilation of a room than when provided with a single passage designed mainly for insuring the proper withdrawal of the combustion products.

In fig. 2 a modified construction is shown—distinguished mainly by the addition of an intermediate passage H, which may be regarded as part of either the main burnt-gas passage or of the main air passage. The passage H conveys not only air to the chimney but also any residue of combustion gases which may escape the passage D and pass over the upper face of the fire-brick. The greater part of the air stream flows through the passage G. Fig. 3 is similar to fig. 2 except in the shape and disposition of the passages D, G, H.

The construction shown in fig. 4 is characterized by the disposition of the passage D. This is situated rather higher above the radiants than in the other constructions, and may receive part of the ventilating air in addition to the products of combustion. The remainder of the air is drawn beneath the canopy into the passage G, "where it is sufficiently removed from the radiants to avoid any detrimental cooling effect upon the radiants."

Gas-Heated Radiators.

TWIGG, W. R., of Luton, and WILLIAMS, D., of Kennington Road, London, S.E.

No. 23,446; Oct. 16, 1913.

This invention relates to gas-radiators for use in places where there may be inflammable substances in the atmosphere—such as petrol vapour in garages—in which the flame is enclosed in a protected area, the air inlets and outlets being covered with fine wire gauze, and in which a pilot light or an electric or other igniter in the protected area is used to relight the main jet after it has been temporarily extinguished. The invention has for its object to protect the wire gauze from any possible injury in use and to provide an inspection or observation plate.

Recovering as an Ammonium Salt the Nitrogen of the Hydrocyanic Acid in Crude Coal Gas.

SOUTH METROPOLITAN GAS COMPANY, and EVANS, E. V., of Old Kent Road, S.E.

No. 29,047; Dec. 16, 1913.

We purpose giving this interesting specification, practically speaking, in its entirety.

A known process for disposing of the hydrocyanic acid present in crude coal gas consists in absorbing the hydrocyanic acid in the form of ammonium sulpho-cyanide, and then treating the latter so as to convert the cyanogen nitrogen into ammonia which may be worked-up with the ammonia present as such in the crude gas.

Among methods of treating the ammonium sulphocyanide for the object in question, heating it with sulphuric acid has been mentioned. No directions for obtaining ammonia in this manner have, however, been given, either in this connection or in any other save in the scientific investigation hereafter cited. It is known that some of the nitrogen in a sulphocyanide is converted into ammonia when the salt is hydrolyzed, while some of the carbon becomes carbon oxysulphide or carbon dioxide.

The chemical change is generally represented by the equation:

$$NH_4SCN + H_2O = COS + 2NH_3.$$

And Klason in 1887 investigated the reaction from the point of view of the conditions under which it must occur in order that the yield of carbon oxysulphide may be a maximum.

We have found that these conditions are not such as are suitable for the maximum yield of ammonia, which latter is obtained, of course, in the form of a salt of the acid used for hydrolysis.

Temperature is the most important condition for our purpose. With regard to this factor Klason merely states that the effect of temperature on his reaction is only to increase its velocity as the temperature is raised. We have found that the temperature plays a much more important part than Klason supposed, if the reaction is considered from the point of view of the production of ammonia. By operating at a temperature considerably higher that that suitable for the maximum yield of carbon oxysulphide, the production of bodies containing nitrogen of the type of thiocarbamic acid, which (as may be gathered from Klason's statement) are inevitably formed as products of the reaction, may be substantially avoided, and a yield of ammonia obtained which is comparable with that represented by the foregoing equation. This was not to be foreseen, since Klason has stated that these nitrogenous compounds resist the attack of even strong acids at the temperature of the water bath.

According to the present invention, therefore, the ammonium sulphocyanide made from the hydrocyanic acid in crude coal gas is hydrolyzed by an acid (preferably sulphuric acid), at a temperature not lower than 50° C., and under conditions of concentration and proportion by mass suitable for obtaining the maximum yield of ammonia in the form of an ammonium salt.

The best temperature can only be ascertained by experiment when it has been decided what is to be the proportion of ammonium sulphocyanide to acid, and what is to be the degree of dilution of the mixture undergoing reaction. These conditions vary with the nature of the coal carbonized, the mode of carbonization, and the particular process adopted for absorbing the hydrocyanic acid in the form of ammonium sulphocyanide—in short, with the practice of gas-works or coke-oven installation where the invention is applied.

The invention is primarily intended for gas-works or coke-oven works where ammonia is used for making ammonium sulphate. Here it is convenient to use sulphuric acid for the hydrolysis; and owing to the fact that excess of acid must be used for obtaining the best yield of ammonia, the liquor produced by the hydrolysis is a suitable liquor for feeding the saturator of the ammonium sulphate plant, from which the yield is increased by the sulphate produced by the hydrolysis.

In such works the temperature of reaction should be between 80° and 110° C., since this is best for the conditions likely to prevail when ordinary gas coals are used—namely:

(1) An extraction of some 95 per cent. of the cyanogen in the crude gas in the form of a solution of ammonium sulphocyanide of 25 to 30 per cent. strength.
(2) The use of sulphuric acid of 70 to 80 per cent. strength for the ammonium sulphate saturator.
(3) Such a proportion of ammonia in the gas that, if the acid in the saturator is to be equivalent to both this ammonia in a given volume of the gas and that equivalent to the ammonium sulphocyanide produced from the cyanogen in that volume, the volume of acid (of the above strength) used to hydrolyze the sulphocyanide should bear the ratio to the volume of ammonium sulphocyanide solution (of the above strength) of about 1·5 : 1.

Thus, with an ammonium sulphocyanide solution of 30 per cent. strength the following procedure may be expected to give some 96 to 99 per cent. of the theoretical yield of ammonia as calculated from the foregoing equation; and this ammonia will be contained in an acid liquor suitable for the saturator of the ammonium sulphate plant in a works operating on lines common in London gas-works.

Sulphuric acid of 70 per cent. strength is maintained at a temperature of 80° to 90° C. in a vessel provided with a stirrer. Into the vessel is run slowly the solution of ammonium sulphocyanide; the rate of flow being adjusted to avoid violent escape of gas, and care being taken that the proportion by volume of the total quantity of sulphocyanide solution to that of the acid is 1 : 1·5. The stirrer is worked vigorously throughout the operation, and the temperature of the liquid is maintained at 80° to 90° C., by a steam jacket or otherwise.

Since there are so many variable conditions affecting the process, it is practically impossible to set forth the best procedure for all conditions. The following experimental work, however, may be prescribed for those wishing to ascertain the best conditions for the particular strength of sulphocyanide solution or sulphuric acid which is to be used: Assuming that a test made on the lines of the foregoing example with the sulphocyanide solution and sulphuric acid at disposal fails to give a satisfactory yield of ammonia (say, about 96 per cent.), the nitrogen escaping hydrolysis may be found either in the form of a precipitate in the vessel or may have escaped as a gas during the reaction.

The first observation to be made in this case is whether or not there is a precipitate in the reaction vessel or considerable dilution with water of the liquor of the reaction vessel produces a precipitate. In either event the temperature of the reaction should be increased until that is found which ensures the absence of a precipitate. Another method of avoiding a precipitate is to increase the relative volume or strength of acid employed for hydrolysis—an increase of relative volume being more effective than an increase of strength. The temperature to be maintained should be only slightly above (say, 5° or 10° C.) that at which precipitation is avoided.

If, on the other hand, the elevation of temperature does not procure the high yield of ammonia required, or the temperature is elevated to such a point that the reaction becomes difficult to manage owing to proximity to the boiling point of the mixture, and there remains an inefficient yield of ammonia, it is an indication that the quantity of nitrogenous gases lost by volatilization is considerable. To overcome this, a larger relative volume of acid or acid of higher concentration should be used. It is obvious that a lower concentration of sulphocyanide solution would effect the same result.

To exemplify this, if an inefficient yield is obtained by hydrolysis, and no precipitate is formed, it is generally an indication that the temperature maintained during the reaction is too high. If on reducing the temperature a precipitate occurs before the efficient yield of ammonia is attained, then the volume or strength of the acid must be increased, or the sulphocyanide solution diluted.

The precipitate herein mentioned should not be confused, the patentees remark in conclusion, with a small quantity of sulphur which is sometimes produced (especially with concentrated acids) as the result of the reducing action of sulphuretted hydrogen.

Gas-Furnaces for Boiling or Melting Purposes.

TOOTH, L. F., of Stepney, E.

No. 7636; March 26, 1914.

This invention relates to a modification of that described in patent No. 18,523 of 1912, and comprises means whereby a better heating is obtained and the furnace more easily erected.

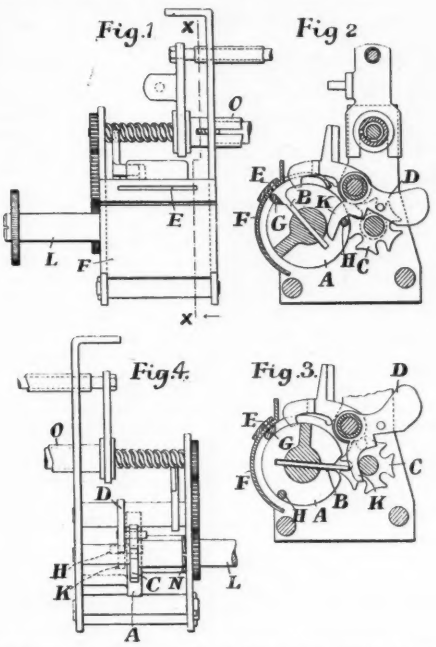
According to the present invention, the annular flue surrounding the heating chamber is divided horizontally by partitions. The uppermost part communicates with the heating chamber, as before; also the lowest part is provided with symmetrically disposed outlets in the base, leading to the chimney. Symmetrically arranged openings are formed in each partition whereby the various parts of the annular flue communicate with one another; the openings in any one partition being situated midway between those in the next partition, or in the base, as the case may be. By this construction, the products of combustion are caused to traverse a longer path, "thereby giving a greater regenerative effect and more efficient heating." To facilitate the erection of the furnace, two sets of blocks are utilized—one set forming the wall of the heating chamber and the other set being so constructed as to form the annular flue and partitions. In order that only a few blocks may be necessary, both sets are made conveniently large and quadrant-shaped.

Coin-Freed Gas-Meter Mechanism.

GEORGE GLOVER AND CO., LIMITED, and DOUGLAS, W., of Chelsea, S.W.

No. 26,055; Nov. 13, 1913.

This invention relates to the coin-freed meter mechanism described in patents No. 20,710 of 1899 and No. 5108 of 1907, in which a revolving coin carrier working in conjunction with a concave disc shaped like the driven wheel or disc of a Geneva stop motion is used; the connection being made by a coin inserted in the carrier.



Douglas's (George Glover and Co.) Coin-Freed Meter Mechanism.

Fig. 1 is a front elevation of the coin-controlled mechanism. Fig. 2 is a sectional elevation (on the line X) of the parts in the position they occupy when the coin pocket is ready to receive a coin. Fig. 3 is a sectional view showing the position of the parts after the coin has been moved round to engage the wheel which it actuates. Fig. 4 is a rear view of the mechanism.

A is the coin-carrier furnished with a coin-pocket B; C is the wheel actuated by the coin; D is the locking catch. Underneath the coin-slot E in the casing F is mounted a flap G, which is journalled at its end in the frame of the mechanism by journal pins which are in line with one side of the flap—the free sides of the flap resting on the carrier. The flap tends to fall down away from the coin-slot, and does so fall down in one position of the coin carrier—viz., when the coin pocket is brought opposite the slot E (the carrier being recessed or shaped as in fig. 2 to allow of the falling). But when the carrier is rotated to operate the mechanism, the flap G is raised by the periphery of the carrier, and maintained in a position in which it closes the coin-slot (as in fig. 3) so that there is no thoroughfare through the coin slot excepting when the pocket of the carrier is opposite the slot.

On the coin carrier is also provided a pin H, which, when the carrier is brought to the position for receiving a coin, engages the part K of the locking lever D and prevents it being lifted to disengage the wheel C. So that while the coin pocket is in position for receiving a coin the lever D is locked and cannot be raised to release the wheel; but when the coin-carrier is rotated, the pin H is moved away from the locking lever and the latter can then be actuated by the coin.

The rotation of the spindle L of the operating mechanism therefore serves both to close the coin-slot by turning the flap G and to release the locking lever D.

In addition to the devices named there is also introduced a washer N or other friction device on the spindle of the Geneva stop wheel C, to prevent the spindle from rotating too easily—thus avoiding any chance of the spindle being rotated by the turning of the sleeve nut O, which is actuated by the meter mechanism.

APPLICATIONS FOR LETTERS PATENT.

19,285.—GARRETT, T. F., "Spit for gas-ovens." Sept. 1.
19,287.—BARNES, F. V., "Lighting and extinguishing gas-lamps." Sept. 1.
19,342.—GUEST, A. A., and GIBBONS, W. P., "Discharging and charging gas-retorts." Sept. 2.
19,350.—GILCHRIST, A. C., "Pipe-joints." Sept. 2.
19,392.—CROSSLEY, K. I., and BRIGHTEN, H. W., "Distillation of tar." Sept. 3.
19,418.—DRAKES LIMITED, and DRAKE, J. W., "Regenerative furnaces." Sept. 4.
19,435.—MARRIOTT, G. J., "Gas-scrubber." Sept. 4.

Brisbane Gas Company.—The accounts for the half year to June 30, which were submitted at the meeting of the Company last month, showed an amount to the credit of profit and loss (inclusive of the balance brought forward) of £21,448. The dividend of 6 per cent. which was recommended would (with the tax) absorb £15,120, and leave a sum of £6328 to be carried forward. The Directors announced that Mr. W. H. A. Chester, who (as recorded in our pages at the time) was recently appointed Assistant-Engineer to the Company, had entered upon his duties. Part of the material for the vertical retort installation had arrived; and the work in connection with the contract was proceeding.

MISCELLANEOUS NEWS.

DOVER GAS COMPANY.

The Half-Yearly Meeting of this Company, on Monday last week, was presided over by Mr. WILLSHER MANNERING, who, in moving the adoption of the report and accounts [*ante*, p. 529], expressed regret at the recent death of Mr. R. Hesketh Jones, who was intimately associated with the Company from 1848 to 1885, when he relinquished the position of General Manager. To the last he continued to take great interest in the affairs of the Company, of which he was one of the largest shareholders. Continuing, the Chairman said that, in common with other gas companies, they had suffered considerably from the very high price of coal and the lower value of residuals. There had also been a decrease of 1 per cent. in the sales of gas. The revenue from this source, as compared with the corresponding half of the previous year, showed a decrease of £342, and that from residuals of £269. On the other hand, meter and stove rentals were £62 more, making a total decreased revenue of £549. The increase of expenditure amounted to £1242. The net profit for the half year was £2205; and in order to provide the dividend, it was necessary to draw £1318 from the surplus profit balance of former years, leaving £6339 to be carried forward. He concluded with an expression of appreciation of the satisfactory manner in which the work had been dealt with by both officers and men.

The report was adopted, and a dividend for the six months to June 30 at the rate of 7½ per cent. per annum, less income-tax, was declared.

The Chairman, the Secretary (Mr. E. C. Fielding), and the Resident Engineer (Mr. E. C. Herring) responded to a vote of thanks to the Directors and the staff.

MIDDLETON ELECTRICITY UNDERTAKING.

Inspector's Caustic Comments.

A Local Government Board inquiry was recently held at Middleton, by Mr. R. H. HOOPER, into an application by the Council to borrow £7610 for extensions at the electricity works, repayable in fifteen years. In the course of the proceedings there were some extraordinary financial disclosures; there being a debit balance of £1815 on the revenue account carried forward on April 1 last.

The INSPECTOR pointed out that an undertaking could not be carried on on credit like this. The requirements of the previous Order were that all losses should be made up out of the current rates. He did not think the Board would sanction any scheme for further expenditure until the loss was met. The Council knew they had to meet it, and they had no right to incur a loan contrary to the terms of their Order. The loss would have to be met, the same as other local authorities had had to do. Did they propose to carry it on until next year?

The TOWN CLERK (Mr. Entwistle): Yes.

The INSPECTOR: You have no power whatever to do so. It is perfectly and clearly set-out on your Order what you have to do. It must be met out of the current rate.

The TOWN CLERK read the section from the Order as follows: "Any deficiency on any year not paid out of the reserve fund shall be charged upon, and payable out of, the local rate."

The INSPECTOR: I think the Board will require you to comply with the terms of the Order.

The TOWN CLERK: It does not say when the rate shall be levied.

The INSPECTOR: Here you have the loss; and I am afraid it will have to be met.

The TOWN CLERK: We shall have to levy a rate for it.

The INSPECTOR: It will not do to carry forward this balance.

The TOWN CLERK: Unless before the end of the year we see there is a reasonable prospect of it being wiped off by the profit during the current year, we shall have to levy a rate.

The INSPECTOR: That will not be satisfactory. The Board will want it paid off before granting the present application. A rate can be levied to-morrow for the purpose.

The TOWN CLERK: Our rates are extraordinarily heavy, and I do not think our people can do it just now.

The INSPECTOR: That, of course, is a matter to deal with the Board about.

EXPORTS OF PIPES, TUBES, &c., FROM GERMANY AND AUSTRIA-HUNGARY.

A fortnight ago, notice was taken of a report by the Commercial Intelligence Branch of the Board of Trade on the exports from Germany and Austria-Hungary of internal-combustion motors, &c. This has since been followed by reports on other industries, drawn up in a similar manner, and having the same object in view—namely, to assist British traders. In one of these, tubes, pipes, and fittings of iron and steel are dealt with; and in another, screws, nails, and bolts and nuts.

The following is the value of iron and steel tubes, pipes, and fittings exported from Germany, Austria-Hungary, and the United Kingdom to all destinations in a recent year. Exported from Germany in 1912: Iron tubes and pipes, pipe connections of non-malleable cast iron, rough and worked—over 7 mm. thick, £304,000; 7 mm. or less in thickness, £78,000; fittings for conduit-pipes (taps, valves, &c.) worked, £218,000; spiral pipes, rolled or drawn, pipe connections, rough and worked, £258,000; other pipes, rolled or drawn—rough, of material of any thickness, £2,094,000; worked—of material 2 mm. or more in thickness, £918,000; of material less than 2 mm. in thickness, £87,000; tube joints and fittings of malleable iron for steam-boilers, steam-drums, reservoirs, &c., £426,000—total, £4,383,000. Exported from Austria-Hungary in 1913: Pipes of non-malleable cast iron, including joints for the same, rough or worked, £1510; pipes of wrought iron, rolled or drawn, or of malleable cast iron, with or without bored, soldered, or welded flanges, not including joints for same; corrugated piping, rough or worked, £8700; pipes riveted, soldered, or lap-welded from plates and sheets, rough or worked, £1750; pipe-joints (fittings) and flanges of wrought (malleable iron), rough or worked, £880—total, £12,840. Exported from the United Kingdom in 1913: Iron or steel tubes, pipes, and fittings, wrought, £2,959,000; pipes and fittings, cast, £1,702,000—total, £4,661,000.

Referring to German exports (1912) of tubes and pipes and exports from the United Kingdom (1913), the report says: "The distribution of the products of these two exporting countries is very different. Thus, fully one-third of the British exports go to British Dominions—Australia, South Africa, Canada, and the Straits Settlements. In Egypt, China, Japan, and South America, British manufacturers are doing fairly well, though German competition is becoming strong in Brazil and Chile. We have a fair share of the trade in Norway and Sweden; but in the remaining European countries our share of the trade is distinctly small. Even to countries like Italy and Roumania, which can be easily reached by sea, we supply but a small part of their requirements of these goods. The value of German and British exports of tubes and pipes and fittings to Western and Southern Europe were roughly as follows: From Germany, £2,500,000; from the United Kingdom, £330,000. It is clear, therefore, that there is an immense field open to our manufacturers in European markets, as well as in the Far Eastern and South American markets." Details are then given which show that the aggregate value of the German trade which might be diverted to English manufacturers is £3,979,500—in the United Kingdom market £328,600, and in the Colonial and neutral markets £3,650,900.

In a despatch dated February, 1913, His Majesty's Trade Commissioner states that Germany's exports to Canada of pipes and tubes consist mainly of iron or steel pipes or tubes, plain or galvanized, riveted, corrugated, &c., and lock-joint pipes; iron and steel pipes over 6 inches in diameter used in the manufacture of buoys; and steel flues and tubes for marine boilers. It is considered that these classes of goods could be supplied by British manufacturers to a much greater extent than is at present the case. The following is extracted from the report of His Majesty's Trade Commissioner on the trade of Canada for the period 1906-10: "Tubes are chiefly imported from the United States. The increase in total imports between 1906 and 1910 was 37 per cent.; the increase from the United States being 25·7 per cent., and from the United Kingdom 79 per cent. The removal of the German surtax may increase German competition. There is in Canada a large market for pipes for heating purposes; 7 feet of 1-inch pipe being used for every 100 cubic feet of space, and larger sizes being needed for mains. In this branch of manufacture the American firms have paid great attention to the accurate rolling of "skelp"—the steel or iron strips from which tubes are made—a matter in which British goods have been defective. All iron piping must be made on American standards of size, thread, and weight."

As to Australia, though Germany's share of the total imports is small, there is a considerable volume of trade which British manufacturers, in view of the strong position they already hold in the Australian market, should have reasonable prospects of securing. The trade in cast-iron pipes is relatively unimportant, and is practically all of it British. There is a big industry for the manufacture of pipes of this class at Lithgow, N.S.W. The imports of water-bore casing for artesian wells are increasing. Over two-thirds of the trade is with the United Kingdom; the principal competition being with the United States and Germany. The most important branch of this trade is that in iron and steel pipes and tubes not over 6 inches internal diameter, including flexible metal tubes, Galloway and vertical parallel boiler tubes, fittings, and unpolished tubes. While the value of the trade increased from £452,000 in 1910 to nearly £771,000 in 1912, the British percentage proportion declined from a little over 83 per cent. to about 74 per cent.

The following relating to South Africa is extracted from the report of His Majesty's Trade Commissioner for 1913: "Iron and steel pipes and fittings comprise a class of goods to which British manufacturers must continue to give very close attention. In my previous report I pointed out that Germany was making great efforts to capture this trade by means of her 'solid-drawn' tubing. At that time the only solid-drawn pipe in this market was the 'Mannesmann,' but since then the 'Phœnix' (the product of a second German firm) has been introduced. The result of this fresh competition between German firms has led to a keen cutting of prices, which, incidentally, adds to the difficulties of British firms." The value of imports of pipes and fittings for the years 1910, 1912, and 1913 shows that, while the United Kingdom still remains the principal supplier of iron and steel piping in South Africa, our relative position as a competitor has suffered to the extent of practically 10 per cent.

Recent German Consular reports state that cast-iron pipes, which command good prices, are imported into Egypt chiefly from France and the United Kingdom. Drain pipes are an English speciality, while pipes for water and gas supply come mainly from France. The demand is likely to increase, as numerous new undertakings are projected. Germany supplies large quantities of wrought-iron gas and water pipes. As to Roumania, the trade in gas and water pipes, boring pipes, and steel tubes has undergone a change in recent years, in that the demand has greatly increased, owing to the increased activity of the petroleum oil companies. In this trade, the Westphalian and Upper Silesian works take the first place in the market.

His Majesty's Consul-General at Valparaiso recently reported that, in his opinion, British trade in iron and steel piping in Chile might be considerably extended. Although the bulk of the imports are from the United Kingdom, German competition is very keen.

A recent issue of the "London Chamber of Commerce Journal" states: "The imports of pipes at the Japanese port of Moiji in 1910 included values of £5818 from the United Kingdom, £3437 from

America, and £1541 from Germany. For this trade, forged iron and steel pipes are mainly required, other kinds being produced in Japan. The establishment of gas-works in Japan, notably in the district of Shimonoseki, foreshadows a large demand for these goods, which cannot be supplied by the home industry."

THE LIGHTING INDUSTRY AND THE WAR.

In view of rumours that had got about with regard to the injurious effect of the war on the lighting industry, our contemporary, the "Illuminating Engineer," recently addressed a letter to some of the leading manufacturers of lamps and lighting appliances, asking them to state their views on the situation. When publishing the replies, in their September issue, the remark is made that, in particular, fears had been expressed that the supply of lamps and mantles would not be sufficient to meet immediate requirements; but according to the communications so far to hand, it would appear that the general impression is re-assuring.

Gas Lamps and Mantles.

Views on the subject of gas lamps and mantles are set forth in the two following communications.

Aug. 21.

Sir,—With reference to your inquiry regarding the effect of the present war, I may say that I have received and filled up a form from the Board of Trade bearing on this point; and I pointed out then the difficulty of saying anything very definite as yet. No one can foresee what the conditions in a few months' time may be, although most of us believe that eventually British industries will resume their normal course, and even be more prosperous than before the war.

Meantime, we are faced by a shortage of many materials. The probability of a shortage in mantles has received much comment. It may interest your readers to know that during the last week we have received large consignments of mantles from our works in Belgium, actually at work less than 50 miles from the seat of war. There is also the difficulty of getting glass and porcelain, and many other things hitherto supplied by Germany. We have already given orders for thousands of china parts for burners to be made in this country. They will cost more than corresponding German or Austrian goods; but they can be made in this country, and will enable us to carry on.

There are, of course, countless other sources of dislocation—for example, the fact of the Government taking control of the supply of spelter and lead. But before long additional supplies should be available, and the price of metals should return to a more normal figure; and the Government can help by securing continuity of supply.

To put the matter shortly, I believe that, although the experience of the next few months will doubtless be trying, the ultimate results will be good. The present is a time of activity and adaptation to the new conditions, not of stagnation. The immediate effect will be that many things previously made in Germany will now be manufactured in this country; and in time to come we should be in a position to supply many necessities for which we are at present dependent on foreign countries.

J. Bridger,
Managing-Director, New Inverted Incandescent Gas Lamp Company, Limited.

Aug. 30.

Sir,—In answer to your letter, I may say that the present situation is naturally causing inconvenience to us, as to all firms in the lighting industry, but that we have every intention of carrying on business as usual, and have ample stocks of most materials for some time to come. For example, we hold stocks of mantles that should suffice to meet our normal demand for six months; and although high-pressure mantles require more thoria than those intended for use with low pressure, we do not anticipate any serious difficulty in providing what may be required.

We are also proceeding with the manufacture of our lamps as usual; and as these lamps are now being made entirely in this country, there is no reason to fear interruption of the supply. As regards glassware, we are prepared to supply all required for high-pressure lamps; and, as is well known, the cups used on our silica lamps are of British manufacture.

We quite agree as to the desirability of arranging matters so that this country should never be entirely dependent on abroad for supplies; and for some time we have been aiming at putting our business on such a footing. The present opportunity should be taken advantage of to foster this tendency; and we have little doubt that in the future the effects of the present situation will not only cease to be injurious, but will even be beneficial in enabling us to do business on a bigger scale than before.

G. Keith.
(James Keith and Blackman Company, Limited.)

Electric Lamps.

Statements with reference to electric lamps are made by writers connected with the General Electric Company, the Lamp and Wiring Supplies Department of the British Thomson-Houston Company, Siemens Bros. Dynamo Works, the Brimsdown Lamp Works, and the Edison and Swan United Electric Light Company. Large stocks of raw materials and lamps are spoken of; and generally speaking no serious inconvenience appears to be anticipated in any direction. One writer remarks: "The question of foreign supplies for British industries is one that seriously hampers the smooth working of the industrial enterprises; but I have no doubt that the ingenuity and commercial talents of British industries will speedily find a way to overcome the existing difficulties. I fully agree with the view that it would be most desirable to arrange matters in the future in such a way that the manufacturers in this country should never be entirely or partially dependent on foreign countries for supplies; and I think that the present conditions will be the means of making everybody take steps that in future dislocation of business on account of shortage of foreign supplies will be obviated."

The Acetylene Industry.

Mr. T. E. Allen, the President of the Acetylene Association, states that he has been assured that, at the present moment at any rate, there is no anxiety as to a failure of the supply of carbide. Other replies regarding the acetylene industry bear out views expressed by Mr. C. Hoddle and Imperial Light, Limited—that, in addition to the small quantity of carbide manufactured in England, cargoes will continue to be (as is the case at present) received from Norway and Sweden. In the matter of price, the rise in freights and heavy insurance have to be considered; but Mr. Hoddle remarks that the present price of carbide is "about 15s. per cwt., which is only slightly above the ordinary figure."

Petrol Air-Gas Lighting.

As to petrol air-gas lighting, the following letter is quoted.

Sir,—In reply to your inquiry regarding the effect of the war on petrol air-gas lighting, we are, so far, hopeful that the industry will be able to maintain its position. The maintenance of the mantle supply is, of course, essential to us, in common with the rest of the gas industry. We suggest that in this respect the Board of Trade might be able to assist, not only in securing supplies of the thorium and other natural products necessary to the manufacture of mantles, but also in making it impossible for any attempt at cornering these products to succeed. So far as the supply of the petrol we use is concerned, we have had no difficulty, and there has been no increase in price.

We hope that private as well as public schemes for building, &c., which were projected for the autumn will be carried through as far as circumstances permit, as this will do untold good in steadying those numerous forms of industry—such as lighting, hot water, and similar work—which depend on such schemes. We are glad to state that so far we have not had a single contract cancelled.

County Light, Limited,
per C. P. Blatchley, Managing-Director.

Illuminating Glassware.

Finally, we may reproduce an interesting communication that was received on the subject of illuminating glassware.

Aug. 29.

Sir,—You ask in your letter whether the war will have any effect upon the manufacture of "Holophane" glassware, and in answer we would say that fortunately it has been the policy of this Company to have its products manufactured in this country, and with this in view a very considerable amount of money has been spent in the production of the necessary moulds. In addition, we carry large stocks both at our stores and at our works, so that we can hardly conceive that circumstances will arise of such a nature as to prevent us dealing with our orders as promptly as usual. In saying this, it should, of course, be remembered that the best glass depends very materially upon its supplies of sand (and oil), which may be curtailed; and there is just the possibility of difficulties in both these directions. We feel some little satisfaction that, even in a small portion of the lighting business such as ours is, we shall be able to meet the demands of those of our customers who have appreciated the pioneer work done by us in connection with scientific illumination generally.

We certainly agree that it is desirable to manufacture, as much as possible, independently of foreign sources; but how far this is possible, bearing in mind the amount of raw and partly manufactured material which comes from other countries, is somewhat difficult to estimate. Experience would tend to show that, in a country situated as ours is, it is difficult, if not impossible, to be independent of the supplies from others; and this is likely to be illustrated in the electrical industry within the next few months.

It is desirable to the highest degree that earnest efforts should be made to take advantage of the situation, both for the home and export trade; but this is not going to be done by continuing the methods which have been prevalent in the past. The German manufacturer owes his rapid advance in the export field, among other reasons, to:

1.—The fact that he pursues, by means of direct representation, every avenue of trade available to him in foreign countries.
2.—He is more approachable, in the sense that he is willing to make materials to suit a given market.
3.—His terms of payment are much more elastic than are common to us.
4.—His literature is framed to suit the language and custom of the particular country whose trade he is attacking.
5.—His prices, as a rule, are considerably lower.

If we are to reap any permanent advantage, some, if not all, of these methods must necessarily be adopted; and we are not likely to make progress if we take advantage of the present situation to increase prices and to make conditions of payment abnormal. An illustration of this occurred the other day to a prominent firm of shippers, whose orders most people would welcome under any conditions. But the execution of an order placed before the war was refused by a certain manufacturer, unless the cash was paid before delivery. The order had to be placed in this particular instance; but when the foreign trade revives, as it may do in the next three years, the recollection of such an incident may act in a manner detrimental to this country.

The patriotism needed from a business point of view is that which makes an earnest, but quiet, study of the situation, and makes equally earnest efforts to obtain orders for this country, based on the supposition that a man who pays generally has something to say in the selection of his goods, and as to the manner in which they are offered to him.

One notices the motto "Business as Usual" is used extensively just now; and if the situation is to be turned to our advantage, it would appear that this motto is opposed, in one sense, to what is really required. In other words, instead of doing business on our usual lines, we need to do it on lines more adapted to the need of the time.

H. H. Thompson (Holophane Limited).

Milnrow Gas Company.—The working for the six months ended June 30 resulted in a profit of £905; and the dividends declared are at the rate of 9 per cent. per annum on the original shares and 6 per cent. on the new shares, both free of income-tax. The profit is practically the same as a year ago.

TRADING WITH THE ENEMY BILL.

Last Wednesday, the Attorney-General (Sir J. Simon) asked leave to introduce into the House of Commons a Bill to make provision for penalties for trading with the enemy. He pointed out that by the common law of this realm trading with the enemy was a crime; but it had been thought convenient to issue a proclamation stating in more detail what transactions were prohibited and what were permitted. Experience had shown that it would be well to revise this proclamation and issue a new one, stating more clearly the rules that must be observed, and in particular prohibiting certain transactions that were not prohibited in the earlier proclamation. It was proposed to prevent the making of any payment to an enemy, even though the payment arose from a contract entered into before the war began. The expression "enemy" meant a person, firm, or company resident or carrying on business in a hostile country, irrespective of nationality. Offence would be made a misdemeanour punishable either summarily or on indictment. On a summary conviction, the maximum penalty would be imprisonment for twelve months, or a fine of £500, or both. On conviction after indictment, penal servitude for seven years would be the maximum penalty. The Bill would confer upon the Board of Trade or the Secretary of State power to apply to a Magistrate for leave to inspect the books and documents of a firm which there was reasonable grounds for suspecting had committed the offence of trading with the enemy. In special cases, this power of inspection was conferred upon the Public Department without application to a Magistrate. The remaining provisions of the Bill were shown to be needed by recent experience. The Board of Trade were empowered, in cases where the business was one that in the public interest should be continued, but was in danger of being discontinued owing to difficulties of management connected with the war, to apply to the Court for the appointment of a Receiver of the business, so as to enable it to be carried on. It would be foolish to say that, just because some enterprise had Austrian or German connections, it should be ostracized. The true method was to make certain that such an enterprise did not transmit goods or profits to the enemy's country. Again, in regard to the payment of dividends to shareholders who were foreigners, the Government were not engaged in any process of confiscation. It was a matter not only of commercial good faith, but of good business, to make it plain to private citizens that their reasonable commercial interests and vested rights in this country were safe. The question had been raised whether objection would be taken to payments which English merchants or others wished to make in discharge of just debts to agents here of firms in the enemy's territory. He had some doubts whether a man could be said to have any such agency once the war had broken out; but he hoped arrangements might be made to enable such liabilities to be discharged, taking due precautions that money or goods would not be transmitted to the hostile country.

The New Proclamation.

A special supplement of the "London Gazette" was issued last Wednesday night relating to the subject referred to by the Attorney-General. From and after the date of the Proclamation, which bears date Sept. 9, all persons carrying on business in the King's Dominions are warned among other things:

(1) Not to pay any sum of money to or for the benefit of an enemy.
(2) Not to compromise or give security for the payment of any debt or other sum of money with or for the benefit of an enemy.
(3) Not to accept on behalf of an enemy the drawing or accepting, paying, presenting for acceptance or payment, negotiating, or otherwise dealing with any negotiable instrument.
(4) Not to accept, pay, or otherwise deal with any negotiable instrument which is held by or on behalf of an enemy: Provided that this prohibition shall not be deemed to be infringed by any person who has no reasonable ground for believing that the instrument is held by or on behalf of any enemy.
(5) Not to enter into any new transaction or complete any transaction already entered into with an enemy in any stocks, shares, or other securities.
(6) Not to make or enter into any new marine, life, fire, or other policy or contract of insurance with or for the benefit of an enemy, nor to accept or give effect to any insurance of any risk arising under any policy or contract of insurance (including re-insurance) made or entered into with or for the benefit of an enemy before the outbreak of war.
(7) Not directly or indirectly to supply to or for the use or benefit of, or obtain from an enemy country, or an enemy, any goods, wares, or merchandize, nor directly or indirectly to supply to or for the use or benefit of, or obtain from any person, any goods, wares, or merchandize for or by way of transmission to or from an enemy country or an enemy, nor directly or indirectly to trade in or carry any goods, wares, or merchandize destined for or coming from an enemy country or an enemy.
(8) Not to permit any British ships to leave for, enter, or communicate with, any port or place in an enemy country.

A Suggested Curtailment of Public Lighting.—The Newmarket Urban District Council being desirous of economizing, were struck by the idea that the public lighting would be a good direction in which to make a start. They therefore wrote to the Gas Company asking whether they would be prepared to reduce the light, and the charge, by one-third. The Company replied that they could not accede to the suggestion, and did not feel that it was in the best interests of public trading to break existing contracts. They, however, added that they would be pleased to consider any further suggestions the Council might make which would be for the good of the community. The Electricity Company (who light the Avenue) agreed temporarily to reduce the candle power of the lamps by one-half and the cost of the lighting by one-third.

ABERDEEN CORPORATION WATER SUPPLY.

Inspection of the New Works at Invercannie.

The new water-works which the Aderdeen Corporation are constructing at Invercannie were recently inspected by members of the Town Council, accompanied by the Water Engineer (Mr. Cecil H. Roberts) and the Assistant Water Engineer (Mr. G. Mitchell). On the road a halt was made at Mannofield, where the progress of roofing reservoir No. 2 was examined. It has a capacity of 12 million gallons, and will be roofed with a 4¾-inch reinforced concrete monolith slab, covered with earth and grassed. It will be supported by main and secondary reinforced concrete beams cast in one with the roof slab. The supporting columns are 293 in number, and the contract amount for the work is £12,897.

On arriving at Invercannie, an inspection was first made of the gauge basin and the liming station. In the former the water, on its way to the settling reservoir, passes over a rectangular weir, where it is measured. During its passage through the basin it receives the lime water, which is manufactured and measured in the liming-house close by. The process of liming the water was followed with close attention. The lime is first weighed in its solid state and slaked, after which it is mixed with its due proportion of water and allowed to run into the main supply. After receiving the lime, the water passes on to the settling reservoir, which has recently been altered by the construction of a helical reinforced concrete baffle wall, 6 inches thick and 1500 feet in length. The wall, which winds round the interior of the basin in spiral fashion, ensures the full beneficial effects of the storage by preventing the direct running of the water to the outlet. The water is guided round by the baffle wall to the centre of the reservoir, and finds its way out by means of a submerged concrete pipe. After storage, the water is conducted to the filter-beds, of which there are at present four, either working or in course of construction.

The filter-beds were examined with the greatest interest, as they constitute one of the leading methods for the elimination of sewage under the purification system adopted by the Town Council. The two original filters have been reconstructed by the removal of the old materials and by concreting the sides and bottom. One of the reconstructed filters is in use; the other is almost ready. With the two new filters, each half-an-acre in extent, good progress has been made; and it is expected that the work will be finished by the end of the year. The filters are constructed on the latest lines, with a bottom of perforated bricks, on the top of which are placed rubble stones, smaller stones, and rough gravel. Above all this is a bed of fine sand, 3 feet in thickness, which forms the main portion of the filter. The new filters are being built in concrete; the sand being excavated near the site. The cost of the works is estimated to be £28,700.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

Provost Melrose reported to a meeting of the Kelso Town Council last week upon the negotiations which had been entered into between the Council and the Kelso Gas Company, with a view to the adoption of an electric lighting scheme for the town. He said that such an undertaking could be more advantageously carried out by the Gas Company than if a private company were formed. A Committee was appointed to confer further with the Gas Company, and to report.

At the annual Valuation Court for the Burgh of Airdrie, some discussion took place on the valuation of the Corporation Gas-Works, The new Assessor (Mr. S. H. Francis) had fixed it at £5204. Mr. Dugald Currie (the Manager) asked that it be fixed at £4818, while the Parish Council claimed, as ratepayers, that it should be no less than £6000. The Court finally fixed the valuation at £5000.

The assets of the various undertakings for the past financial year have been submitted to the Aberdeen Town Council. The Electricity Department showed a net profit for the year of over £4000; the works costs being less than in the previous year, notwithstanding an increased output and a higher price of coal. The price for the coming year is to be the same as last year. The accounts of the Gas Department indicated that on the year's working there was a credit balance of £3604, or £2000 more than the estimate. The price of gas was fixed at the same as last year.

At the Valuation Appeal Court for the Western Division of Stirlingshire, the Kilsyth Gas Commissioners appealed against a valuation amounting to £1020, and suggested that a proper figure would be £861. Mr. James Anderson, the Treasurer to the Commissioners, stated that since 1907 their valuation had been arrived at on the average of five years; and now the Assessor desired to change the system to the average of three years, to the loss of the Commissioners. If five years were taken, the figures worked out at £845; but as a basis of compromise the Commissioners were willing to agree to £870 for this year, and to fall in with the Assessor's proposal for a three years' average next year. The valuation was fixed at £872.

An installation of high-pressure gas lighting on the Keith system is now in operation at Hawick Railway Station. It consists of 175 separate lamps (controlled from convenient points) varying from 80 to 1000 candle power; and the efficiency of the lighting is acknowledged. Seven of the largest lamps are distributed over the goods yard; and the improved lighting greatly assists the night work there. It is stated that Hawick is the first station in Scotland to be lighted on this system, and that the success of the experiment is inducing the North British Railway authorities to extend it to several of their other stations.

As will be seen above, the new water-works which the Corporation of Aberdeen are constructing at Invercannie have been inspected by the Town Council, accompanied by Mr. C. H. Roberts (the Water Engineer) and Mr. G. Mitchell (the Assistant Water Engineer). The scheme is an extensive one; the cost of the works being estimated at nearly £30,000.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 14.

Business in tar products continues practically at a standstill, and there is no change to report in prices, with the exception of crude carbolic acid, which can be called from 2s. to 2s. 3d. per gallon net, casks free, for 60's.

Sulphate of ammonia remains without change, and the price is nominal at £10 15s. per ton net at makers' works, for 25 per cent. quality; but there seems to be a little more inquiry for the article.

Sulphate of Ammonia Prices in the Provinces.

LIVERPOOL, *Sept.* 12.

During the past week the market for this material has remained somewhat inanimate, and it has only been possible to dispose of those parcels which have been offered for sale by making a little further reduction in price. The closing quotations are £10 8s. 9d. per ton f.o.b. Hull, £10 10s. per ton f.o.b. Liverpool, and £10 11s. 3d. per ton f.o.b. Leith. There has been a small amount of inquiry for delivery over the early months of next year, but the prices quoted by producers for this period have altogether precluded business.

Nitrate of Soda.

This market has continued dull, but holders have not so far reduced their quotations below 10s. 9d. and 11s. per cwt. for ordinary and refined quality respectively, on spot.

COAL TRADE REPORT.

Northern Coal Trade.

The northern coal trade is beginning to recover a little of the volume of business that it lost; but the extent of the loss may be seen by the official statement just issued—that last month the shipments of coal from the Tyne were little more than half those for the same month of the past year. Steam coals are in fair demand—the Archangel district's needs having increased. Best Northumbrians are from 13s. to 13s. 3d. per ton f.o.b.; second-class steams are 11s. 9d. per ton; and steam smalls are more plentiful at 8s. to 9s. The collieries seem to be working rather better. In the gas coal trade, shipments for the South of England are a little heavier, and the local consumption increases. The foreign shipments are not so heavy, however, and Italy and Norway seem rather better customers, though the difficulties in transport, and in the payment, are not wholly overcome. Best Durham gas coals are about 12s. 6d. per ton f.o.b.; second-class gas coals are near 11s. 6d. per ton; and "Wear Specials" are quoted at 13s. per ton f.o.b. Buying, beyond any contracts that are running, is chiefly for cargoes that are pressingly needed; but there are believed to be inquiries for some 20,000 tons of gas coal for Antwerp, and it is possible that, with all the difficulties of delivery there, it will be arranged. It is, however, evident that each such contract will need special terms, at any rate during the time of hostilities. Coke is quiet, with an average output. Gas coke is rather irregular in price—from perhaps 11s. 9d. to 12s. per ton f.o.b.

SUPPLIES OF COAL FOR GAS-WORKS.

[FROM THE "NEWCASTLE DAILY CHRONICLE," SEPT. 7.]

Comparatively little coal is going forward to London for the gas-works. The rule that colliers making the passage to the Thames have to anchor at night is doubtless reducing shipments to a minimum; for it delays the voyage and vastly increases the cost of carriage. The gas companies, however, are reported to have very large stocks in hand, and to be practically independent of shipments for some eight weeks to come. The lesson of the great coal strike has evidently not been lost upon the London Gas Companies. The cutting-down of supplies, caused by the war, is enabling the gas companies to get rid of a good deal of coke, which is now being bought as a substitute for coal. They are also finding a good many customers for sulphate of ammonia, which used to come so largely from Germany. Similarly, our chemical works on the Tyne are reaping a home harvest with several of their products; for while they have lost a big proportion of their export trade, people in this country who have been dealing with Germany have now to pay very much enhanced prices. In the sale of residuals the gas companies will now be able to recoup themselves for recent losses in this department. Their main reduction in profits last year, of course, was due to the higher cost of coal; but the current contract price is less than the figures now quoted for prompt shipment—less by far than the discounted figures which coalowners would be glad to take at present merely to keep their pits going.

Woking Water Company.—At the half-yearly meeting of this Company on the 1st inst., the Chairman (Mr. A. H. Baynes, J.P.) said the profit on the revenue account was £6342, compared with £5910—an increase of £432. The new consumers obtained during the past twelve months numbered 207, compared with 219, 260, 245, and 180 for the four preceding years. In the same period, the net revenue from water-rental had increased from £15,525 to £19,892—an average annual advance of £873. During the half year, 156½ million gallons of water were pumped, compared with 133¾ millions for the corresponding period of 1913. There were now 136¾ miles of mains, 7288 rated consumers, and 769 meter supplies. In conclusion, the Chairman expressed the Board's warm appreciation of the valuable services rendered by the Secretary (Mr. B. D. Holroyd) and the Engineer (Mr. H. J. Crane). Mr. J. E. Plummer seconded the motion, which was carried, as was another formally declaring a 6 per cent. dividend.

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New Gas Manager for Tipton.

The Tipton Urban District Council have (as is announced in our "Personal" column to-day) appointed Mr. W. Prince, of Stoke-upon-Trent, as Engineer and Manager of their gas-works, in place of Mr. S. O. Stephenson, who is going to Worthing. It was arranged that, as Mr. Stephenson was remaining until the end of the month, Mr. Prince should be at the works for the last fortnight of that time. Addressing Mr. Prince, the Chairman said: "You have been elected as successor to a very able Manager, Mr. Stephenson. If he were not present, I should say a great deal more. It will be no easy matter to emulate the example Mr. Stephenson has set us in gas manufacture. For years he has given eminent satisfaction to the whole of the members of the Council; and I hope you will continue to make our gas concern prosperous. Your election was almost unanimous; and I give you a very hearty welcome to Tipton on behalf of the Council."

Workmen's Compensation Application.—At the Lynn County Court last Thursday, the Lynn Gas Company applied for the termination of an award of 10s. per week granted to Charles Walker under the Workmen's Compensation Act. Evidence was given to the effect that on Oct. 11, 1913, respondent met with an accident, which necessitated the amputation of a thumb. It was argued that he had now recovered from the effects of the accident, and that the award should be terminated. The application failed.

Blackburn Ratepayers' Gas Complaint.—A leading Blackburn journal last week published several letters from aggrieved consumers regarding the alleged offensiveness of the gas supplied by the Corporation. Later in the week, the Gas Department explained, by means of notices and official advertisements, that, owing to the purifiying-boxes having taken fire, an unavoidable amount of sulphur had for a few days been sent out along with the gas. The notice was signed by Mr. John Shorrock, the Vice-Chairman of the Gas Committee.

Sale of Tamworth Gas Shares.—A highly successful sale of new shares in the Tamworth Gas Company has proved that the Directors were right in their opinion (which they had the courage to put to the test) that, even in such a time as the present, a good gas share would retain its customary enviable place in the opinions of capitalists. The sale, which was conducted by Messrs. T. & J. G. Lowe, consisted of 158 new shares of £20 each, entitled to a maximum dividend of 7 per cent. The money is required for the provision of high-pressure plant, an additional holder, and further mains, fittings, &c. On the existing capital, the Company has for more than thirty years paid the full statutory dividends of 10 and 7 per cent. The 158 new shares were put up in 44 lots, which were disposed of in less than three-quarters of an hour. The highest price reached was £28 10s. per share, and the lowest £27 10s.; the average figure being £27 17s. 6d. per share. The sale was regarded as very satisfactory, and shows that the public have every confidence in the undertaking, and its management.

Clitheroe Gas Accounts.—The annual accounts of the borough of Clitheroe show that the gas undertaking is the most profitable branch of municipal work. The gross profit is £4321, from which £500 has been taken in relief of the rates.

Keighley Gas Undertaking.—During the year ended June 30, the gross receipts of the Keighley Corporation Gas-Works were £14,839, and after deducting £1034 for interest on loans, £5953 for sinking fund charges in reduction of debt, and transferring £2899 to renewals and insurance account, there was a net profit of £4952. Out of this, the Gas Committee have granted £6358 to the general district rate.

Manchester Stipendiary and Prepayment Meter Thefts.—In a case at Manchester a month or so ago, the Stipendiary Magistrate (Mr. Edgar Brierley) said he regretted to have to deal with so many cases of petty larceny from prepayment gas-meters, and warned future offenders that they would receive three months' imprisonment if the act was deliberately committed. On Thursday last, the Manchester Corporation (through Inspector Sweeney) prosecuted at the City Police Court a well-dressed young man named George Sellars for stealing 6s. 9d. from a prepayment meter at his father's house, and he was sent to gaol for three months with hard labour, without the option of a fine. His friends vainly made an effort to induce the Stipendiary Magistrate to mpose a monetary penalty.

Bexhill Water and Gas Company.—The accounts for the half year ended June 30 show an available balance at credit of profit and loss account of £7363. The Directors recommend a dividend for the six months at the rate of 6½ per cent. per annum on the capital authorized by the Acts of 1885 and 1892, and at the rate of £4 11s. per cent. per annum on the capital authorized by the Act of 1896, the Order of 1901, and the Act of 1904, less income-tax. The sum absorbed will be £3890, so that there will be £3473 to be carried forward. As compared with the corresponding period of last year, the revenue from gas shows an increase of 5½ per cent., and that from water of 4½ per cent. The erection of the new retort-house is practically completed, and it is stated that gas will now be manufactured under more favourable and economical conditions.

Woking District Gas Company.—The Directors report that the sales of gas for the half year ended June 30 show an increase of 8·13 per cent. over the corresponding period of 1913; while the receipts for residual products also exhibit the substantial increase of £219. The revenue for the six months amounted to £10,078, and the expenses on revenue account to £7679, leaving a net profit of £2399 to be carried to the profit and loss account. To this had to be added a balance of £1388 brought forward; and after charging interest on debentures and loans, there remained an available balance of £3524. The payment of dividends on the preference stock at the rate of 5 per cent. per annum, and on the "A" and "B" ordinary stocks at the rate of 5½ per cent. per annum, would absorb £1690, and leave £1834 to be carried forward. The number of Directors has been increased to five by the election of Mr. F. J. Bancroft, B.Sc., to the Board.

BRADDOCK'S RETORT-HOUSE GOVERNORS

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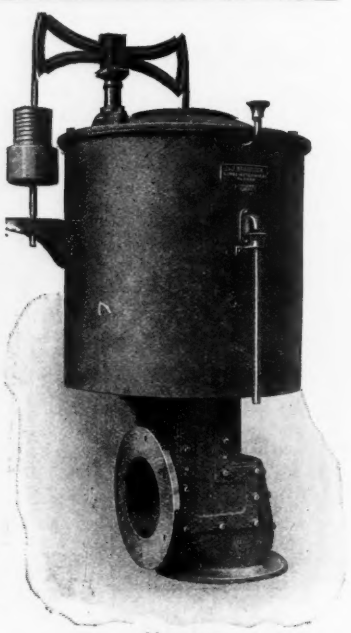
SECOND TO NONE.

Many repeat orders have been received.

Braddock's New Patent Retort-House Governor is a further improvement and is especially desirable for use with Vertical Retorts.



No. 310.
Braddock's New Patent Enclosed Retort-House Governor, Latest Type

Further Particulars upon Application.

J. & J. BRADDOCK (BRANCH OF METERS LIMITED), Globe Meter Works, **OLDHAM.**

Telegrams: "BRADDOCK, OLDHAM." National Telephone No. 815.

AND 45 & 47, WESTMINSTER BRIDGE ROAD, LONDON, S.E.

Telegrams: "METRIQUE, LONDON." Telephone No. 2412 HOP.

Lewes Gas Company.

The report adopted at the half-yearly meeting of this Company stated that there was a profit on the revenue account for the six months to June 30 of £1637. After providing for interest on mortgages, the balance of net revenue was £7653. The Directors recommended dividends for the half year at the rate of 5 per cent. upon the original capital stock and 3½ per cent. upon the additional capital stock. These dividends, after the deduction of income-tax, would amount to £1394. The Directors further recommended that a sum of £150 should be carried to the reserve fund. The Chairman (Mr. M. S. Blaker) said that the accounts could on the whole be taken as quite satisfactory. The Company had earned the dividend they proposed to pay, and there was a small surplus over. The amount received for gas was larger than in the corresponding half year; but the cost of manufacture was also greater. He paid a warm tribute to the efficiency of the officers and men on the staff. These remarks were acknowledged by the Manager (Mr. E. Jones).

Stretford Gas Company.

Presiding at the half-yearly meeting of this Company, Mr. W. A. Nicholls stated that the six months to June 30 had been very successful; the trading resulting in a profit of £5386, which, with the amount brought forward from the last half year, made £5922. The dividends would absorb £4910, leaving £1012 to be carried forward to the next account. Satisfactory as the balance-sheet was, it would have been much more so but for the condition of the coal and residuals markets. Coal and oil had cost £560 more; while coke, tar, and ammonia had produced £450 less. There had been a most satisfactory increase in the sales of gas, amounting to £1110. The results had been brought about by the strictest economy in every department, and especially in renewals, on which large sums had been spent in previous years, and from which the Company were now reaping the benefit. The new machinery had also largely contributed to the saving. The works had, however, not been starved; and he believed there was still a margin for saving, if it was necessary. The new departure of eighteen months ago, of free maintenance, free grillers, and cookers and fires on hire at minimum rates, had more than justified their optimism; and he attributed the large increase in the sales of gas to the policy adopted then. They had reaped very much earlier than they had expected. The report and accounts were adopted, and dividends were declared at the rates per annum of 10, 7½, 7, and 5 per cent. on the various classes of shares. A vote of thanks to the Directors, officers, and staff was passed; and in reply the Chairman said that the greatest credit was due to the Engineer and Manager (Mr. H. Kendrick) and the Secretary (Mr. W. Blundell), for the efficient and painstaking manner in which they had carried on the affairs of the Company. By far the greatest share of the credit for the satisfactory condition of their affairs was due to these two officers. Mr. Kendrick remarked that unaided he could do little. He was fortunate in having an exceedingly capable set of assistants, and had been able with their help to effect economies which it would not have been possible to secure had they been less efficient.

Penrith Extensions to be Carried Out.—On the outbreak of the war, the Penrith District Council decided not to proceed with the important alterations proposed to the gas-works, costing some £7000. At the meeting of the Council last Wednesday, however, after certain reports had been read from the Contractors and Engineers, it was decided to proceed with the scheme at once.

Wilson-Glasgow Vertical Retorts for Derby.—Up to the present no installation of the Wilson-Glasgow continuous-intermittent system of vertical retorts has been made and worked under English conditions. It is, therefore, of interest to learn that the Directors of the Derby Gaslight and Coke Company, at their meeting a few days ago, decided to adopt the recommendation of their Engineer (Mr. J. Ferguson Bell), to erect at their Cavendish Street works a bench of these verticals, comprising six settings of six retorts per setting, capable of making 1½ million cubic feet of gas per diem. This piece of news is referred to in an earlier column.

Dewsbury Municipal Undertakings.—In an abstract of accounts published by the Dewsbury Borough Accountant (Mr. John Hutchinson), the various municipal undertakings of the Corporation are reviewed. The most lucrative of these is the Gas Department, on which the gross profit for the year ended March 31 last was £17,039. After meeting sinking-fund charges to the amount of nearly £9000, there was a balance of £8162, which, with the amount brought forward, left over £18,000 available for distribution. Out of this £10,000 was devoted to the relief of the rates, a grant of £50 was made to the public library, and £7992 was carried forward.

Surreptitiously Obtaining Gas.—A novel method of surreptitiously obtaining gas from a meter has been revealed in the South of England by a prosecution at the Havant County Sessions, where it was shown that Florence North, of South Hayling, had tampered with a gas-meter belonging to the South Hayling Gas Company, so as to make it register 20 cubic feet instead of 14 cubic feet for 1d. The defendant alleged that the meter had caused her a great deal of trouble, and that she had altered it instead of complaining to the Manager. Mr. Gilbert, who prosecuted, said that the scheme was very ingenious. The defendant was fined £1 and 11s. costs, together with £1 15s. 4d. for injury to the meter.

Waterford Gas Company.—Mr. G. Lynch, presiding at the annual meeting of the Company, said that when their late able Manager, Mr. J. G. Tooms, left to go to Buenos Ayres, they feared they might suffer from his absence; but their present Manager, Mr. J. Paterson, had left nothing to be desired in his control of the works. In reference to the Corporation's new Electric Lighting Provisional Order, it would be some considerable time before this form of illumination could be supplied. There might be a temporary decrease in the gas consumption; but he expected that in a short period they would not only regain any ground that might be lost, but would increase their sales beyond the present figure. A dividend at the rate of 7⅛ per cent. per annum was declared.

ONE WAY

To Keep the Flag Flying is to Find Employment for those Left Behind.

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Your esteemed orders for Prepayment or Ordinary Meters, Brasswork, or Repairs, will receive our Prompt Attention.

SAWER & PURVES

(BRANCH OF METERS LIMITED),

Miles Platting, Manchester. Radford Road, Nottingham.

GAS COMPANIES IN THE STOCK EXCHANGE.

The problem of the reopening of the Stock Exchange still remains unsolved. It would be unfair to say that the solution has made no progress during the past week, for it has received the most careful consideration. But it is a matter of such enormous difficulty and complication that the gradual process of surmounting obstacles step by step is necessarily very slow, and almost imperceptible to the outside world. It is no wonder that some impatience is being exhibited—that is only human nature; but it will do no good. Meanwhile, various temporary expedients are being discussed. One that found a fair amount of favour in some quarters was that the Stock Exchange Committee should authorize the publication of a very limited Official List of gilt-edged stocks only, and that all members should be prohibited from dealing outside of its quoted prices. This project, taking enough at first sight, might, however, lead to unexpected difficulties, and would have to be carefully thought out. There has been a moderate amount of business done, in offices and in the street; and the general tone, which opened with some degree of cheerfulness, was gradually heightened by the favourable intelligence received daily from the two seats of war in Western and Eastern Europe. Before the close of the week, indeed, the prospect was regarded so hopefully that there was an evident disposition not to sell yet awhile, and to await higher prices. The scarcity of business affected the Money Market, where there was a superabundance of supply seeking employment, and day-to-day advances could be had at 2 per cent. Our last Official Quotations List is reprinted below.

OFFICIAL QUOTATIONS AT THE CLOSE OF THE STOCK EXCHANGE ON JULY 30.

Bank Rate (fixed Aug. 8), 5 per cent. Last year, 4½ per cent. Consols, —. Previous week, —.

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	April 8	2½	Alliance & Dublin Ord.	59—64	..	3 18 2
374,000	,,	July 10	4	Do. 4 p.c. Deb.	76—79	..	5 1 3
280,000	5	April 29	7½	Bombay, Ltd.	5¼—6⅜	..	5 17 8
50,000	10	Feb. 26	16	Bourne-mouth Gas and Water | 10 p.c. | B 7 p.c. | Pref. 6 p.c.	29—30	..	5 6 8
378,480	10	,,	7		15—15½	..	4 10 4
95,000	10	,,	6		13½—14	..	4 5 9
280,000	Stk.	Feb. 26	14	Brentford Consolidated	261—266	..	5 5 3
330,000	,,	,,	11	Do. New	204—209	..	5 5 3
50,000	,,	,,	5	Do. 5 p.c. Pref.	109—111	..	4 10 1
206,250	,,	June 11	4	Do. 4 p.c. Deb.	91—93	..	4 6 0
217,380	Stk.	Feb. 26	11	Brighton & Hove Orig.	208—213	..	5 3 4
244,200	,,	,,	8	Do. A Ord. Stk.	154—159	..	5 0 8
530,000	20	Mar. 26	12½	British	44—45	..	5 11 1
120,000	Stk.	June 26	4	Do. 4 p.c. Deb. Stk.	88—90	..	4 8 11
245,771	Stk.	June 26	4	Buenos Ayres 4 p.c. Deb.	85—87	..	4 12 0
100,000	10	—	—	Cape Town & Dis., Ltd.	1½—2½	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	4—6	..	—
100,000	Stk.	June 26	4½	Do. 4½ p.c. Deb. Stk.	70—75	.	6 0 0
157,150	Stk.	Feb. 26	5	Chester 5 p.c. Ord.	108—110	..	4 10 11
1,513,280	Stk.	Feb. 12	5/9/4	Commercial 4 p.c. Stk.	106—108	..	5 1 2
560,000	,,	,,	5½	Do. 3½ p.c. do.	103—105	..	5 1 6
475,000	,,	June 11	3	Do. 3 p.c. Deb. Stk.	69½—71½	..	4 3 11
800 000	Stk.	,,	4	Continental Union, Ltd.	76—79	..	5 1 3
200 000	,,	,,	7	Do. 7 p.c. Pref.	115—118	..	5 18 8
492,270	Stk.	—	6	Derby Con. Stk.	123—125	.	4 16 0
55,000	,,	—	4	Do. Deb. Stk.	102—104		3 16 11
1,002,180	10	July 29	10	European, Ltd.	17⅜—18*	..	5 11 1
16,364,910	Stk.	Feb. 12	4/17/4	Gas | 4 p.c. Ord.	98—102	..	4 15 6
2,600,000	,,	,,	3½	Light | 3½ p.c. max.	76—79	..	4 8 7
4,062,235	,,	,,	4	and | 4 p.c. Con. Pref.	96—99	..	4 0 10
4,674,850	,,	June 11	3	Coke | 3 p.c. Con. Deb.	72½—74½	..	4 0 6
258,740	Stk.	Mar. 12	5	Hastings & St. L. 3½ p.c.	87—89	..	5 12 4
70,000	10	April 29	11	Hongkong & China, Ltd.	16½—16⅝	..	6 11 4
131,000	Stk.	Mar. 12	7⅝†	Ilford A and C	151—154	..	5 2 4
65,780	,,	,,	6½†	Do. B	115—118	..	5 8 0
65,500	,,	June 26	4	Do. 4 p.c. Deb.	92—94	..	4 5 1
4,940,000	Stk.	May 14	9	Imperial Continental	150—160	..	5 12 6
1,235,000	Stk.	Feb. 12	3½	Do. 3½ p.c. Deb. Red.	84—86	..	4 1 5
200,242	Stk.	Mar. 12	6½	Lea Bridge Ord. 5 p.c.	119—121	..	5 7 6
561,000	Stk.	Feb. 26	10	Liverpool United A	211—213	..	4 13 11
718,100	,,	,,	7	Do. B	146—148	..	4 14 7
306,083	,,	June 26	4	Do. Deb. Stk.	97—99	..	4 0 10

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
75,000	5	June 11	6	Malta & Mediterranean	4⅛—4⅜	..	6 9 9
250,000	100	April 1	4½	Met. of Melbourne | 4½ p.c. Deb.	99—101	..	4 9 1
541,920	20	May 28	4	Monte Video, Ltd.	11⅛—12	..	6 13 4
1,775,892	Stk.	July 29	4½	Newc'tle&G'tesh'd Con.	9⅝—99½	..	4 10 6
529,705	Stk.	June 26	2½	Do. 3½ p.c. Deb.	82—83	..	4 4 10
55,940	10	Feb. 26	7/14/0	North Middlesex 7 p.c.	14—15	..	5 2 8
300.000	Stk.	May 14	8	Oriental, Ltd.	117—122	..	6 11 2
60,000	5	Mar. 26	10	Ottoman, Ltd.	7⅛—7⅜	..	6 9 0
60,000	50	Feb. 26	13	Portsea, Island B	128—131	..	4 19 3
100,000	50	,,	12	Do. C	118—121	..	4 19 2
249,980	5	April 29	8	Primitiva Ord.	5⅛—6	..	6 13 4
499,960	5	June 26	5	,, 5 p.c. Pref.	4⅛—5	..	5 0 0
521,600	100	June 2	4	,, 4 p.c. Deb.	91—93	..	4 6 0
346,198	Stk.	June 26	4	River Plate 4 p.c. Deb.	85—87	..	4 12 0
150,000	10	May 14	6	San Paulo | 6 p.c. Pref.	10½—11	..	5 9 1
125,000	50	July 1	5	| 5 p.c. Deb.	47—49	..	5 2 0
135,000	Stk.	Mar. 12	10	Sheffield A	223—224	..	4 9 3
209,984	,,	,,	10	Do. B	222—224	..	4 9 8
628,500	,,	,,	10	Do. C	220—222	..	4 10 1
90,000	10	May 28	9	South African	10⅛—11⅛	..	7 16 6
6,429,895	Stk.	Feb. 12	5/9/4	South Met., 4 p.c. Ord.	111—113	..	4 16 8
1,295,445	,,	July 10	3	Do. 3 p.c. Deb.	72½—74½	..	4 0 6
209,820	Stk.	Feb. 26	8½	South Shields Con. Stk.	157—159	..	5 6 11
952,795	Stk.	Feb. 26	6	S'th Suburb'n Ord. 5 p.c.	114—116	..	5 3 5
60,000	,,	,,	5	Do. 5 p.c. Pref.	110—112	..	4 9 3
137,058	,,	June 26	5	Do. 5 p.c. Deb. Stk.	116—118	..	4 4 9
629,740	Stk.	May 14	5	Southampton Ord.	99—102	..	4 18 0
120,000	Stk.	Feb. 12	7½†	Tottenham | A 5 p.c.	135—138	..	5 2 8
742,275	,,	,,	6†	District | B 3½ p.c.	115—117	..	5 2 7
181,255	,,	June 26	4	| 4 p.c. Deb.	87—89	..	4 9 11
182,380	10	Dec. 30	5	Tuscan, Ltd.	5—6	..	8 6 8
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	93—95	..	5 5 3
236,476	Stk.	Mar. 12	5	Tynemouth, 5 p.c. max.	108½—109½	..	4 11 4
				Wandsworth, Wimbledon, and Epsom—			
80,000	Stk.	Feb. 26	8½	Wandsworth A 5 p.c.	151—156	..	5 7 4
255,636	,,	,,	6½	,, B 3½ p.c.	129—134	..	5 2 7
108,075	,,	,,	5/17/3	,, C 3½ p.c.	110—115	..	5 2 0
352,000	,,	,,	6½	Wimbledon 5 p.c.	117—122	..	5 0 5
98,000	,,	,,	6⅝	Epsom 5 p.c.	121—126	..	5 5 2
88,416	,,	June 26	3	3 p.c. Deb. Stk.	66—69	..	4 6 11

Prices marked * are "Ex Div." † Next Dividend will be at this rate.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

DRAUGHTSMAN AND CHEMIST. Southport Corporation. Applications by Sept. 28.
ASSISTANT MANAGER. No. 5932. Applications by Sept. 23.
GAS-WORKS OFFICE No. 5931.
GAS FITTERS, INCANDESCENT MAINTENANCE INSPECTORS, AND SLOT COLLECTORS. Aldershot Gas, Water, and District Lighting Company.

Gas-Works Wanted.

"D.G.," c/o Scripps's Advertising Offices, South Molton Street, W.

Plant, &c. (Second-Hand), for Sale.

EXHAUSTER. Newcastle Gas Company.

Plant, &c. (Second-Hand), Wanted.

PURIFIERS, &c. Eyemouth Gas Company.
STATION-METER. No. 5933.

Sales of Stocks and Shares.

FELIXSTOWE AND WALTON WATER COMPANY. London Mart. Oct. 6.
SOUTHEND WATER COMPANY. London Mart. Oct. 6.

TENDERS FOR

Coke.

WANDSWORTH, WIMBLEDON, AND EPSOM GAS COMPANY. Tenders by Sept. 25.

Lamps (High-Pressure).

SALFORD LIGHTING COMMITTEE.

Pipes, Syphons, &c.

BRADFORD WATER DEPARTMENT. Tenders by Oct. 7.

Tar and Liquor.

GRANTHAM GAS COMPANY. Tenders by Sept. 22.

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